Final Facts on Speedway Combat

MOTOR AGE

Vol. XXVII
No. 21

CHICAGO, MAY 27, 1915

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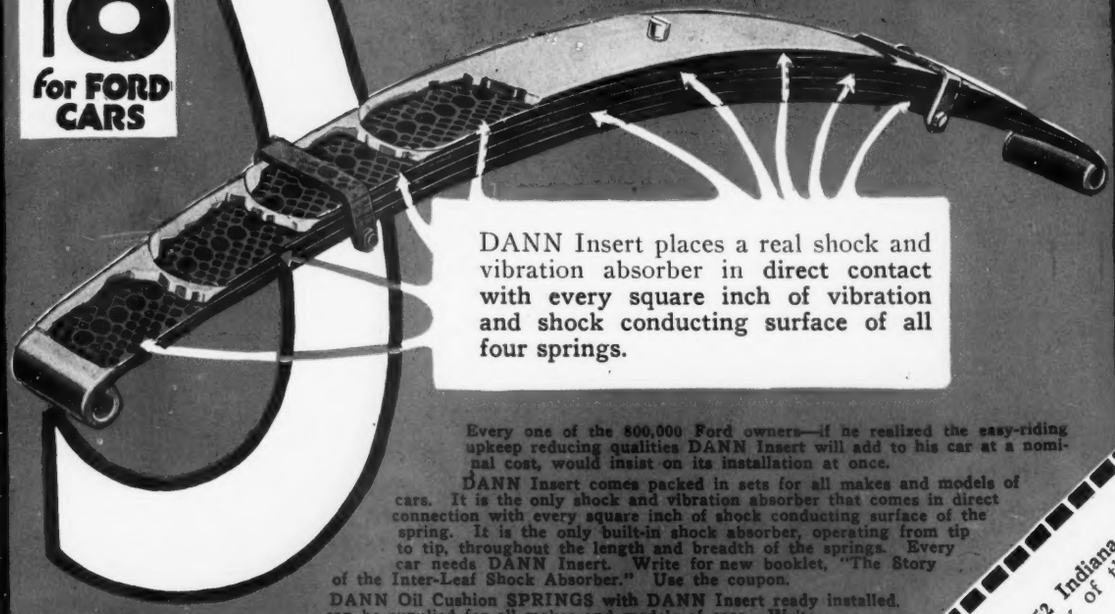

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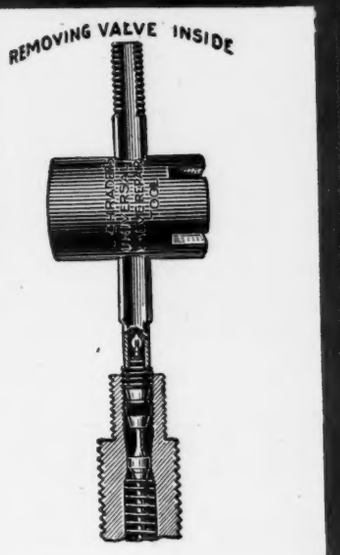

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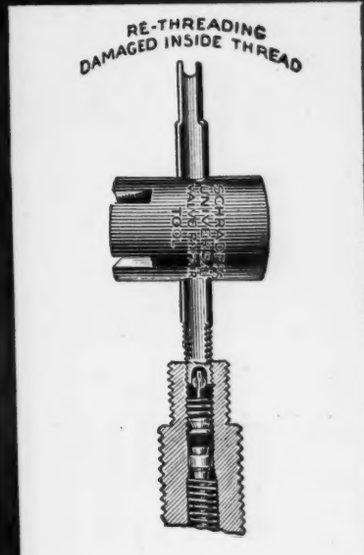

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Volume XXVII May 27, 1915 No. 21

Contents

DEPARTMENTS

"How the 500-Mile Race Was Run and Won," which will be a feature of the next issue of Motor Age, will tell how the winner of the Hoosier classic bested his competitors in the chase for the bag of gold at the end of the five-century grind. It will give a running story from start to finish of the May 29 event.

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After a prolonged season of patent litigation, the Renowned Midgley Wire Tread Tire is on the market once more—**even better** than formerly. Dealers and motorists will remember this tire distinctly as the **only tire on earth that is non-skid from start to finish.**

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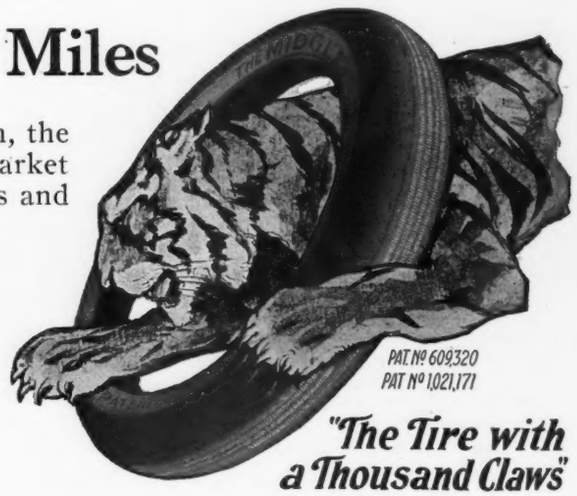

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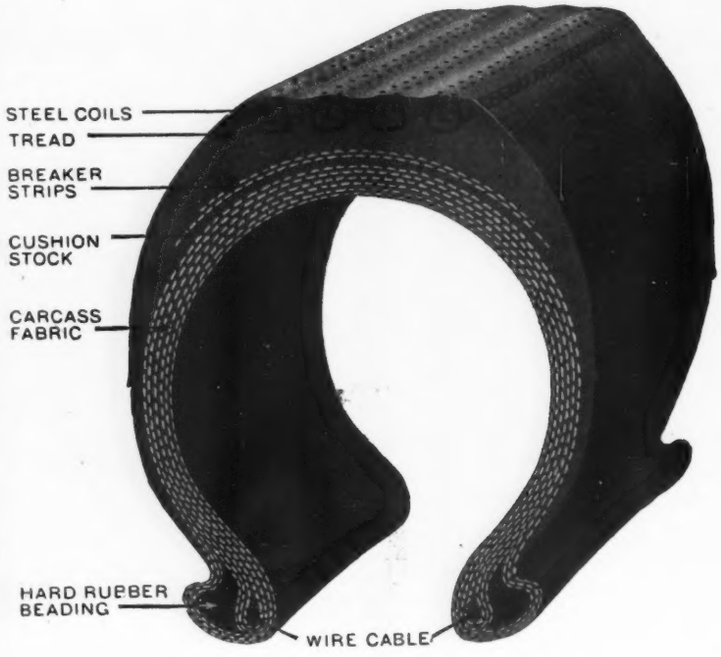

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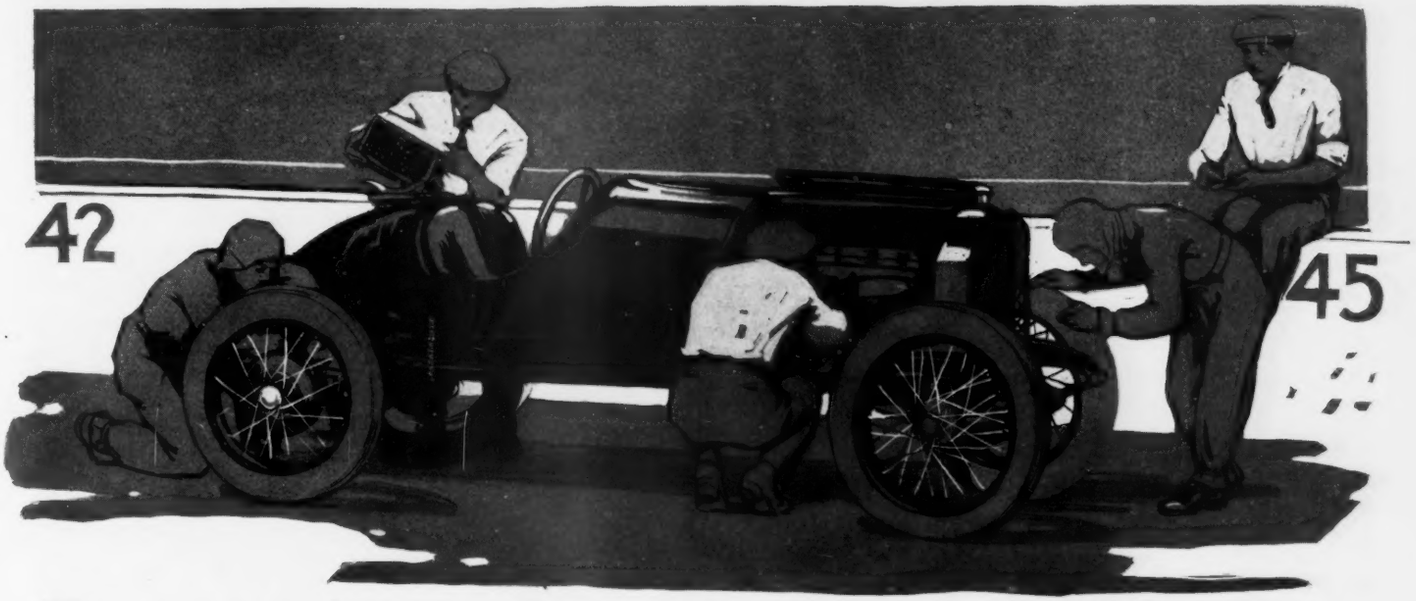


Prepping the Car for the 500-Mile Race

by J. C. Burton

A decade ago, before autocratic state legislatures decreed that "Boots and Saddles" should be censured music, and when the American Derby, the Brooklyn Handicap and the Sheepshead Bay Futurity were turf classics that lived and thrilled, the thoroughbred was a petted, pampered creature. The owner often staked a fortune on his favorite's speed and wind. In the heart of the jockey his mount came first and the one woman afterward. The negro exercise boy worked out the horse at daybreak, when the grass of the paddock sparkled with dew and the sun peeked timidly over the eastern horizon, and at night slept beside his precious charge on the straw of the stall.

The Much Pampered Thoroughbred

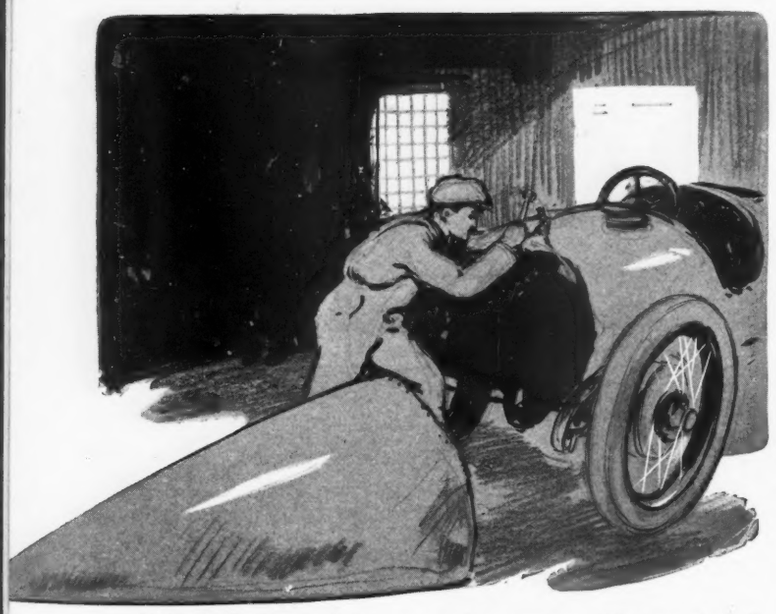
The thoroughbred—the contender for the derby, the handicap or the futurity—meant as much to his owner, his jockey, his exercise boy as gold to the miser. His feed was inspected. His shoes were weighed and tested. He was rubbed down after each work out; his hoofs were packed; his legs were wrapped and bandaged. His every action, either on the track or in the stall, was carefully watched and noted. As temperamental as a prima donna, he was not to be crossed. Each furlong that he covered in practice was clocked. Prepping a horse for a crucial race was a painstaking task, a labor of affection in which much time and energy and thousands of dollars were expended. Yet the purse won rarely equalled the expense to which the owner went in order to get his entry in the pink of condition.

The old sport of kings is dead. Tod Sloan no longer rides his horse's neck and whispers in his ear as the bunched field pounds under the wire in the whipping, spurring, last-stride finish. The names of Salvator, Irish Lad, The Picket and the other monarchs of the turf have been flashed on the score board for the last time. The reckless plunging of Pittsburg Phil and John W. Gates is only a memory. The golden age of the tout is past.

Yes, the old sport of kings is dead, but a new king of sports has been born to reign in its stead. Grimy men, clad in suits of khaki and with their eyes protected by goggles, have replaced the pygmy jockeys, immaculate in white breeches and blouses of brilliant satin. The sportsman of 1915 pays vociferous homage to a creature of steel and metal alloys, not to a thing of flesh and blood. Gasoline, not thudding hoofs and straining legs, is furnishing the power that produces modern speed. The Indianapolis international sweepstakes, the Vanderbilt cup classic, the grand prize race are the American Derby, the Brooklyn Handicap, the Sheepshead Bay Futurity of the present. We still worship at the shrine of an ancient Roman divinity, Mercury, but the idols set up therein are far different than those of 10 years ago.

Thoroughbred of Steel Petted

Yet the old sport of kings and the new king of sports have something in common. Between the prepping of motor cars and the prepping of thoroughbreds for the crucial test, there is an analogy despite the fact that the former are bred in Michigan and Indiana and not amid the blue grass of Kentucky. The lifeless mechanism, like the horse, is petted and pampered. To the driver and mechanician it has human characteristics and whims that must be satisfied. The maker of a team of three racing cars, such as Stutz, Maxwell, Mercer and F. R. P. in this year's international sweepstakes, spends thousands of dollars and hundreds of anxious hours in building, testing, tearing down, reconstructing and developing his thoroughbreds of steel in the roseate hope that they will carry his



Fifty-ninth second changes are not uncommon. The morning of the 1912 500-mile race, the Case engineers decided that Hearne's car was too heavy and ordered the mechanics to chop off the rear end

colors to victory when the time comes for the starting bomb to explode and the smoking exhausts bark defiance in competition for the first time.

A Job of Countless Changes

Because of the almost countless changes that must be made in a motor car in order to attain maximum speed and greatest stamina, the task of prepping a thoroughbred of steel is far more complicated and exacting than that of training a thoroughbred of flesh for a classic. The owner of a derby candidate cannot alter the construction of his horse. He must start him as he is. He cannot lengthen his legs to increase his stride or enlarge his lungs to gain more staying powers. The racing car maker, however, can grind and cut and file, can loosen a connection here and tighten another there day after day and week after week and in the end fail to achieve his purpose and ambitions. When his ceaseless, discouraging labor is cut short by the starting bomb, he may discover before the first lap is completed that the faults which he has attempted to correct have not been eradicated and that all his painstaking work, all his changes and adjustments, all his attention to the minutest details have been for naught.

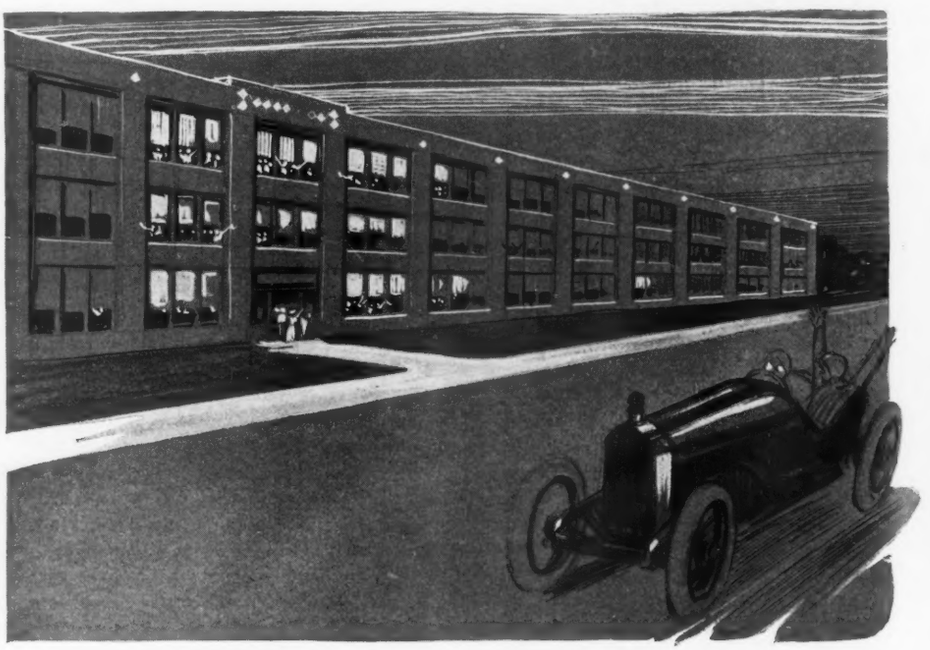
Prepping a car or a team of cars for the 500-mile race is not confined to the few days of practice on the speedway just prior to the running of the annual Memorial day classic. Months before, perhaps a year previous, the cars have been worked out in actual competition or put through their paces on road or track. Rene Thomas had worn his crown of international champion but a few days when Harry Stutz started to design his 1915 entries. In order to study the construction of a French motor of small piston displacement, he purchased the pygmy Peugeot in which Arthur Duray won second money in 1914 for $10,000 and tore the mechanism to pieces to discover the secret of Peugeot success that he might incorporate certain features of design in the distance-destroyers on which he will place his dependence 2 days hence.

One Stutz car was built during the summer, tried out on the Indianapolis speedway and then shipped to California where Gil Anderson drove it in the Vandelbilt cup and grand prize races. The Hoosier maker was not seeking prize money in these events. His primary object in entering these contests was to discover faults that must be corrected before the car would be fit to cover itself with glory in the race of races—the 500-mile flight over the bricks of Carl Fisher's colossal oval. In the first competitive test on the Panama-Pacific exposition course, the grand prize contest, the 300-inch Stutz took fourth money, $1,000, but far more valuable than the purse won was the discovery that the ignition was at fault, a discovery made when the spark plugs burned out. This fault has since been corrected. The changes that were imperative in Anderson's car also have been made in the machines to be tooled by Earl Cooper and Howdy Wilcox Saturday. As a consequence, Harry Stutz is fairly certain of one thing. If he loses the 1915 international sweepstakes, it will not be because of failure to correct defective ignition.

Worked on Marmons 11 Months

The week that the officials of the Indianapolis speedway announced that they would run a 500-mile race in 1911, Howard Marmon started work on the yellow car that was destined to carry Ray Harroun to victory in the first international sweepstakes. Eleven months were spent in building, testing, developing that famous machine and its twin brother, Joe Dawson's mount of 4 years ago. The flower of the Marmon organization was entrusted with their construction, the most expert mechanics in the plant were detailed to build them. The patterns and special forgings were made by hand. Harroun and Dawson worked out their cars daily for 6 months on the speedway. As the day of the race drew precariously near, the arc lights of the experimental shop flared and sputtered all through the night as the heavy-eyed mechanics toiled and sweated that imperative eleventh-hour changes might be made in time.

When the National blue was a hue of Napoleonic triumph, its maker did not procrastinate in preparing cars for the 500-mile race. Two of the three machines entered in the 1912 international sweepstakes were built the year previous and developed in the minor sped events of the 1911 season. Like the owner of a derby candidate, who starts his horse in short distance events to see how the thoroughbred will perform at the barrier and when bunched with the field, the National company tested



The company that builds racing cars for a 500-mile race is sure to suffer because of the destruction of factory discipline. So great is their pride in the company's entry that the employes rush to the doors and windows every time a driver takes his car out of the shop for an experimental run.

its cars in competition and profited greatly, as the result of the 1912 Hoosier classic proved.

Ray Harroun, chief engineer of the Maxwell company, began work on his present Indianapolis entries August 1, 1914, and has had one of the 300-inch machines on the speedway for the past 3 months. With Billy Carlson at the wheel, the mechanical early bird has been sent around the oval for trial spins daily in order to ascertain how it holds to the track and at what rate of speed it takes the turns with the least wear on tires.

Tune Up Cars in Winter

Indianapolis companies that have cars entered in the annual gasoline derby often test their machines in mid-winter when the bricks of the speedway are covered with a light coating of snow and the drivers are forced to wear heavy sweaters, knitted caps and fur gloves to shut out the icy blasts from Medicine Hat. The native son speed stars of the Hoosier capital sometimes celebrate Christmas by tuning up their mounts on the morning of December 25 and a week later start the new year right by reeling off several test laps.

"Man works from sun to sun but woman's work is never done," an adage that has served gas stove makers well in advertising their labor-lightening product, does not apply to the maker of racing cars. His task is endless. A stitch in time saves nine, according to the housewife, but the designer of speed creations brands such a statement as false. The improvement or perfection of one unit of construction often makes imperative a change in several other essential parts. For example, changing the lift of a valve to increase horsepower may make necessary a change of carbureter and the adoption of a design previously discarded as impractical. With each alteration, the engineer must go back over his ground from the very beginning and discard many parts that he has determined upon as ideal.

Developing a thoroughbred of steel is a discouraging, perplexing series of alterations and substitutions. It is fascinating work, however. There are mysteries connected with it, for a large number of phenomena associated with the high-speed gasoline motor are unexplainable and the results obtained often are contrary to principles that the engineers were told were axiomatic. Scientific theories are exploded in practice. The gas engine, in some respects, is as mystifying as electricity and new problems arise daily that require new solutions.

There always is a job of work to do around a racing stable on the gasoline circuit. Like time and tide, the race waits for no man or car and the thoroughbred of steel must be on the starting line when the starting bomb sounds. After weeks of testing and reconstruction, a fault may be discovered at the proverbial eleventh hour. The night before the 1914 Indianapolis classic, Joe Dawson's car was torn down completely in order to correct poor valve timing. The full force in the experimental shop of the Marmon company worked from the middle of the afternoon until morning on the yellow speed creation that it might be ready to answer the challenge of Peugeot, Delage, Stutz and Mercer.

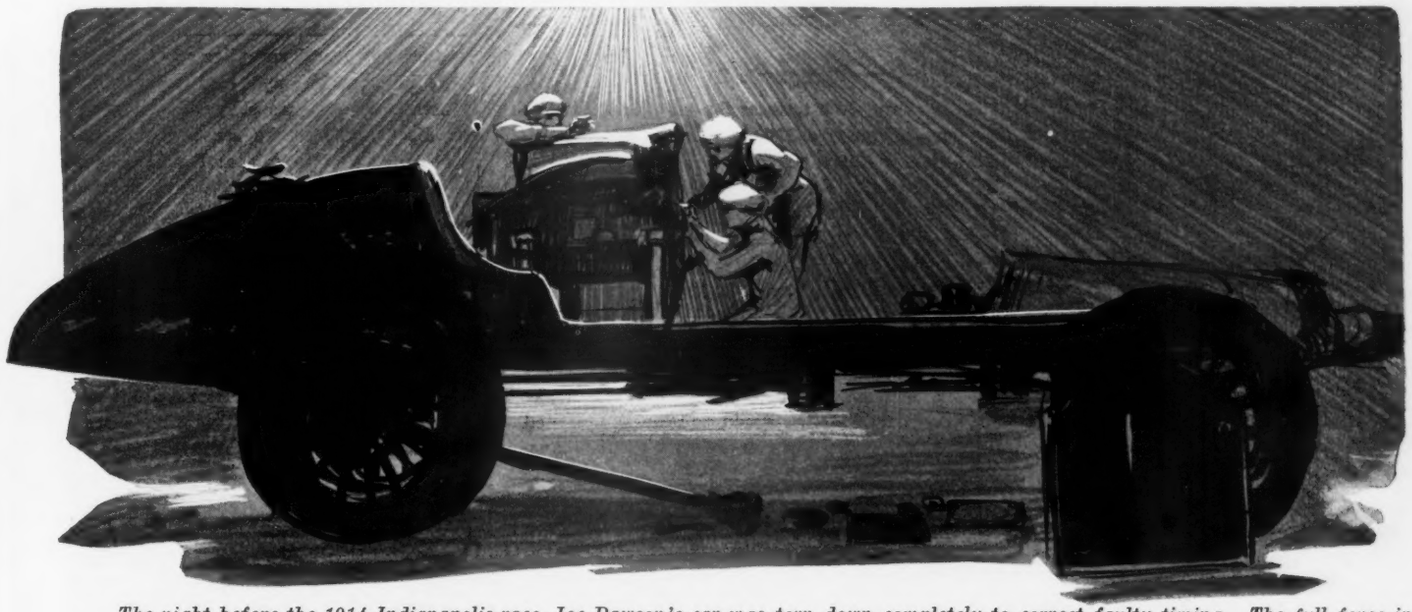
Speedy Operation on the Case

Fifty-ninth second changes are not uncommon. At 9 o'clock on the morning of the 1912 500-mile race, the Case engineers decided that Hearne's car was too heavy and ordered the mechanics to chop off the rear end. When the contenders started to line up, the Case crew was toiling with saw and ax. Scarcely 2 minutes before Carl Fisher, the pace-maker, began his circuit of the track, Hearne rode forth in his mutilated mount, the tail of which looked as if it had served as a butcher's block. And the last-minute, frantic labor was in vain. The car was as hard on tires as before its stern was amputated.

Racing Car Somewhat Standardized

Building a car for the Hoosier classic of 1915 is not as difficult a task as when the race had its inception. Five years ago, when the first speed spectacle was staged on the Indianapolis speedway, the majority of the cars were mongrels, representing as many varied types of design as Jacob's coat had colors, but the maker of today has profited by lessons taught in past 500-mile classics. He has adopted materials and designs that have stood the white heat test of the gruelling grind and rejected parts and principles of construction that failed to stand up under the tremendous strain. As a consequence, there is a noticeable similarity in the vital principles of design and in the chassis dimensions of the 1915 entries, the difference being largely confined to the engineering details. The weight and wheelbase of the cars in a certain class are about the same; the exhaust gases are carried away by means of a curved pipe that eliminates back pressure; the overhead valve motor has been generally accepted as the most efficient type of high-speed engine, American manufacturers adopting it after witnessing the triumphant feats of the Peugeot, Delage, Mercedes and Sunbeam on the saucer of brick.

The standardization of racing cars has progressed to such a high degree that an ordinary mechanic, working alone in a barn and isolated from the engineering forum, should be able to construct a creditable machine capable of high speed provided he has for his guidance the specifications of the entries in the 500-mile races of the past 2 years and the proper tools



The night before the 1914 Indianapolis race, Joe Dawson's car was torn down completely to correct faulty timing. The full force in the experimental shops of the Marmon plant worked from the middle of the afternoon until morning on the yellow speed creation in order that it would be ready to start when the bomb exploded.

with which to make his parts. This would not have been possible 5 years ago when almost every builder had a different theory that was yet to be tested and very little precedent of value to follow in developing his creation of steel.

Work to Pre-determined Speed

First of all, the racing car maker must be a good prophet. He must determine, after studying the records, just what average speed for the 500 miles will be high enough to win the classic. He then must design and assemble a machine that will maintain that average speed for 200 circuits of the 2.5-mile oval, making allowances for the time lost in slowing down at the turns and the precious minutes wasted in stops at the pits for new tires and the replenishment of the original supply of gasoline, oil and water. He must figure all such calculations to the fraction of a second. Before the race starts, he must know how many pit stops will be necessary in the 500 miles of spectacular velocity and to what speed the driver must throttle down in order to negotiate the turns safely and with the least wear on tires.

After designing and building a motor that will attain the average speed decided on in a dynamometer test, the maker must try out the car for the desired speed on the track. An engine that develops the required horsepower in a block test may rebel when worked out on road or track.

One hundred and one faults—improper weight distribution, poor suspension, inadequate carburetion and ignition—may have to be corrected before the motor will show as many revolutions per minute on the speedway as it did when it was attached to the dynometer.

Fairly accurate results can be obtained in designing a motor that will develop a specified horsepower. The car that in its first work-out does not attain within 2 or 3 miles per hour the speed for which it was intended is generally regarded as a poor job. Louis Coatalen, the Sunbeam engineer, is a master in this respect. His most recent achievement was the construction of a car that was built to average 107 miles per hour and in the initial trial at Brooklands, it missed the mark by less than 4 furlongs.

Speed is not the only requirement of the motor. It must have stamina. It must be strong enough to stand up under the terrific strain to which it is put in the five-century grind. Every part must be perfect. Poor design of the smallest unit or the use of weak material in the construction of a piston ring or valve-lifting mechanism will be fatal. The improper adjustment of a connecting rod or crankshaft bearing will result in serious motor troubles.

Speedway Designer's Laboratory

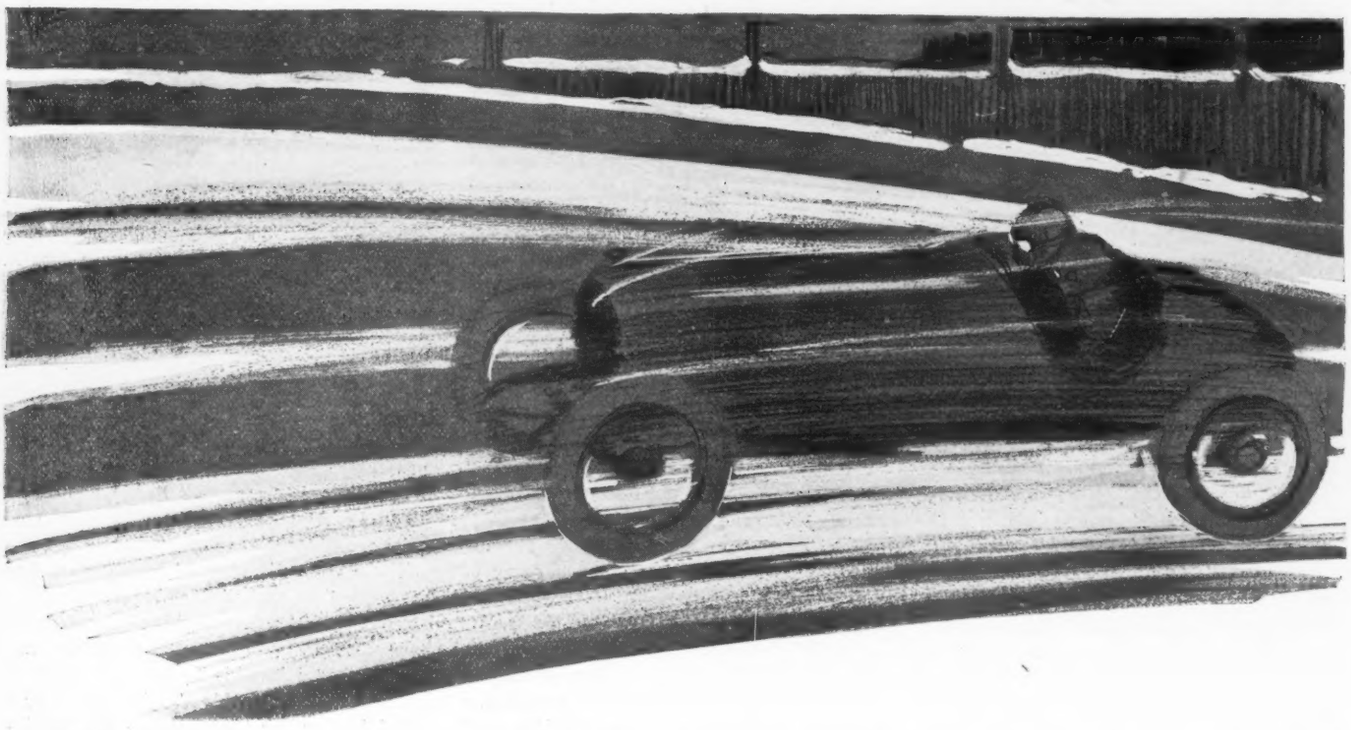
It requires time and patience to develop a car for the 500-mile race. The perfection of every part, no matter how small, is essential. Each day is devoted to testing and rejecting or accepting. The track is the laboratory where the maker experiments with his theories. He tries out different gear ratios in order to obtain maximum speed. A change from 2⅛ to 1 to $2\frac{3}{16}$ to 1 in the rear axle, the addition or elimination of one tooth on the driving pinion, may bring the ratio between car speed and motor speed to that determined upon by the designer in his original plans. He must determine on the size of the valves, the weight of the engine and the proper distribution of parts to gain motor efficiency. He tests different lengths, thicknesses, sizes and elasticities of springs to attain proper balance and keep his car hugging closely to the track. He must get all the traction all the way. If he does not, power will be wasted and tires will be worn by the constant pounding over the bricks.

Car Hood a Pandora's Box

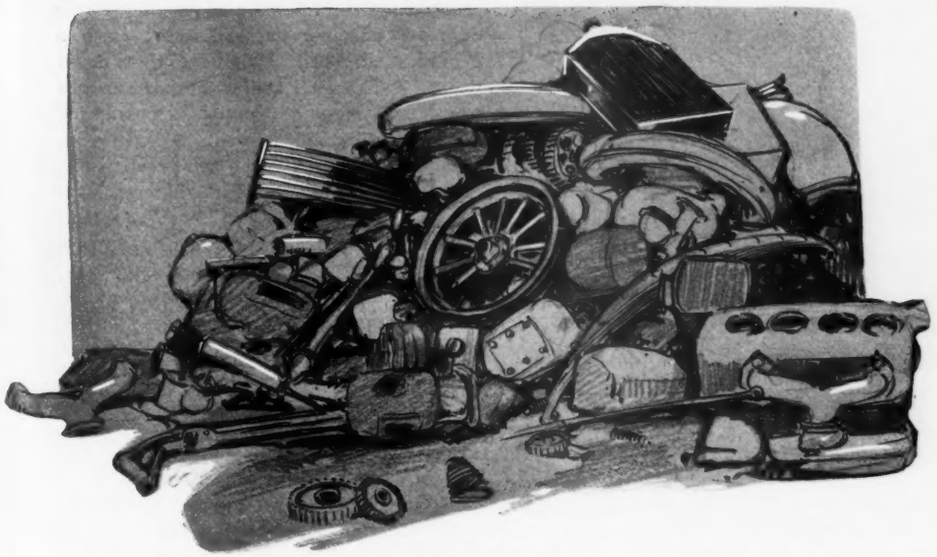
Prepping a racing car is a series of exacting and discouraging tests. Faults that must be corrected are continually being discovered. The first trial runs, after the car has been assembled, are held to determine whether or not fundamental principles of design and construction are practical. The driver, wishing to see if he can handle the car, discovers various ailments. The springs are wrong. So is the steering mechanism. The weight has been distributed improperly. The rear end drags.

The car is taken back to the shop where it is torn down and remedies administered. Tests, to gauge the speed of the machine in sustained runs, are started. The engineer discovers that he must change the timing, the carburetion and the exhaust and intake pipes. Minor faults are found. The gas tanks are fastened insecurely; the lubrication is bad; the shock absorber brackets work loose.

After these and other faults are corrected, the car is worked out to determine its staying powers, its stamina. Compared to the machine, Pandora's box of trouble is a rank outsider. Bearings burn out and make a change in the lubrication system imperative. The magneto shaft goes to pieces under the high-speed gaff. The pis-



Indianapolis companies that have cars entered in the Indianapolis race sometimes start testing their machines in mid-winter, when the bricks of the speedway are covered with a light coating of snow and the drivers bundle themselves in sweaters to shut out the icy blasts from Medicine Hat



In building a team of three cars for a speed classic, seventy-five per cent of the parts constructed and developed finally are discarded as impractical after the thoroughbreds of steel are worked out on the road or track

ton rings stick. The cooling system may be inadequate. The valves or part of the cylinder walls run hot and new parts must be designed and made. The pump may not carry enough water to the radiator, necessitating the installation of a larger sized pump. The cylinder lugs may prove weak.

Tires Next Consideration

About this time, the driver begins to worry about his tires and his springs. Maximum tire mileage is of greater importance in the 500-mile race than an engine capable of developing 150 miles an hour. The engineer may be forced to redistribute the weight of his car entirely in order to save one casing that wears more quickly than the other three.

Faults are quickly exposed, however. Runs of 5 miles usually will reveal a mechanical weakness and an hour's drive will show how much punishment a good casing will stand. A poor tire will show wear or blow after four circuits of the speedway. In the early days of racing on the Hoosier oval, tire tests of 200 miles or more were not uncommon and the driver often burned up from forty to fifty casings in order to determine the life of his shoes. Such long trials are not required today since the cars are lighter and the quality of the tires much better.

There are times, however, when the finding of trouble is a long and tedious task. The solution of some faults is so simple that it is overlooked because of its simplicity and the engineer, taking the problem too seriously, rolls up his sleeves to perform a major operation. Ray Harroun tells of a short-circuited spark plug that caused the motor of the Maxwell to miss fire. Another plug was substituted but the engine continued to hit on three cylinders. The car was torn down and a week's search and labor were futile. Finally, the substituted spark plug was inspected. It, too, was defective, but when it was fitted, Harroun did not notice that the porcelain was cracked. The developing of racing cars is full of annoyances of this kind.

The reduction of vibration to the minimum is one of the most serious problems with which the engineer, building a car for the Indianapolis 500-mile race, has to contend. The steering post, tanks, piping and other parts must be braced to save both car and driver. Although the surface of the speedway seems smooth enough, the continual jolting sustained by man and machine in the 500-mile drive is terrific. The millions of bricks run over at high speed in the 200 circuits of the track cause crystallization, especially in the steering arms and steering spindles, and the vibration in the 500 miles is far more excessive than that suffered by the average touring car in a 10,000-mile trip over the roughest country road in the United States, or the bump-the-bumps highway to Dublin.

After the car has been tested for speed and stamina, the driver begins to worry about his tires. After tests continuing for over a week, the maker often is forced to redistribute his weight entirely to save one casing that wears more quickly than the others

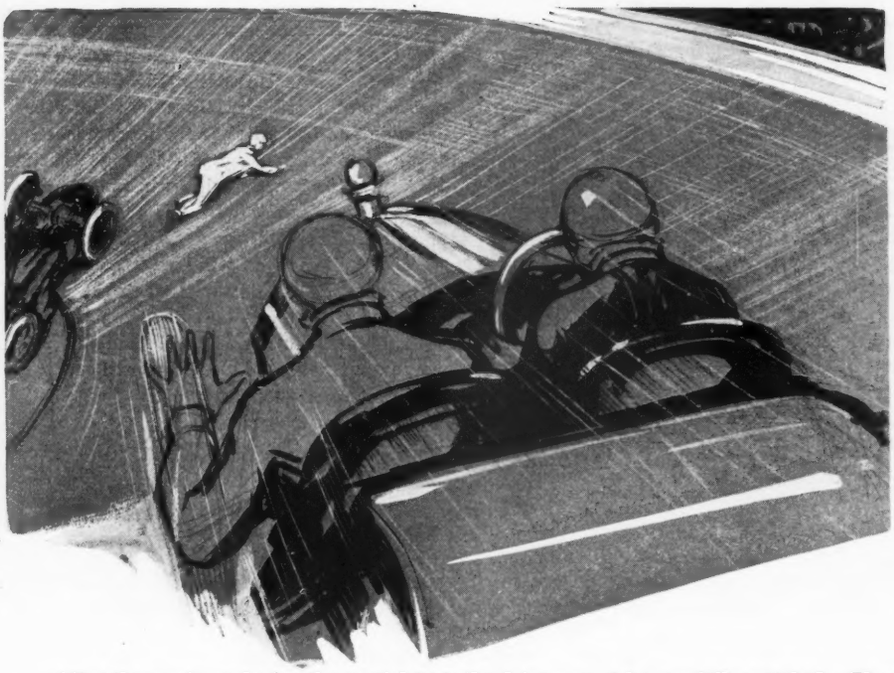
The reduction of wind resistance is another paramount factor in racing. This is a problem that can be solved mathematically before the car is assembled but it is important nevertheless. Up until recently, American designers apparently did not give this problem the consideration that it deserved but the successful invasion of Peugeot and Delage has had its effect and the great majority of the Yankee contenders in this year's classic have low, narrow, streamline bodies, similiar to those of the French, English and German cars, specially designed to nullify the disastrous effects of swirling air currents. An interesting commentary on the subject of wind resistance is furnished by Finley R. Porter, maker of the F. R. P. cars, who discovered in recent tests that it required 98 horsepower to attain a speed of 100 miles an hour, 93 horsepower to overcome the wind resistance and only 5 horsepower to propel the car at that speed.

Wind Bothers Peugeots Little

According to Johnny Aitken, pit boss par excellence and relief driver of the Stutz team, the Peugeot engineers have come nearer to solving completely the problem of overcoming wind resistance than any other designers of the new or old world. In the 1914 grand prix, Aitken tore up his program into small bits and scattered it along the home stretch. When the Peugeots rushed past, the paper was not blown a fraction of an inch but there was a regular stage snowstorm when the other cars swept by the pits.

Building cars for a 500-mile race is a costly undertaking. Approximately 75 per cent of the designs originated and developed are discarded as impractical and the material that is junked would bring oi-yoi joy to the heart of a Jewish peddler. The engineer arrives at the ultimate design and attains the maximum efficiency for his car only by a process of elimination. Ray Harroun, for example, designed and constructed two different types of motors for his 300-inch machines and after testing both, sent one to the scrap heap.

Not only is much time and energy expended and valuable material wasted but factory discipline is destroyed in the company that builds cars for the Indianapolis classic. The esprit de corps of the organization suffers. So great is their pride in the firm's entry that the employes, both in shop and office, leave their benches and desks and rush to the windows every time a driver takes his racing car out of the shop



After the car is ready for the crucial test, the drivers must be carefully watched. They are a temperament lot and are tempted to keep late hours and seek excitement to relieve the nervous strain which they are under. The driver must be as fit as the car. He not only must have nerve but must be capable of constant concentration and quick thinking, ever ready to act in the countless emergencies that arrive every minute of the thrill-glutted day

for an experimental run in the process of tuning up.

The companies that pay tribute at the shrine of the great joss, Speed, have divorced their racing departments from the regular production work. The Maxwell organization for the development of the thoroughbreds of steel consists of from four to six draftsmen who work continually on new designs and a special shop department of twelve men for the assembling and fitting of new parts. National detailed twenty picked mechanics to prepare the three blue cars for the 1912 Indianapolis race and the racing crew of the Marmon organization in 1911 totaled twenty-four men, eight being assigned to each machine. Two weeks before the contest, this force was increased until there were as many as twenty men toiling over a single mount.

Preparing for a race of the importance of the international sweepstakes is not confined alone to building and developing the cars. The engineer and designer, who generally doubles in brass and plays the role of team manager as well, must have a Pinkertonian optic, "the eye that never sleeps." The steel thoroughbreds must be guarded at night or there is a possibility that they will be doctored. Alleged vandalism is not unknown on the gasoline circuit. Teddy Tetzlaff found a wrench in the gearbox of the Fiat before the 1912 Indianapolis race, and when Bruce-Brown's National was eliminated the same year, seemingly because of lubrication trouble, it was found upon investigation that a hose, connecting the oil tank with the crankcase, was stuffed with waste.

After the car is ready for the crucial test, the drivers must be watched carefully. They are a temperamental lot and are tempted to keep late hours and to seek excitement to relieve the nervous strain which they are under. The driver must be as fit as his car. He not only must have nerve and strength but must be capable of constant concentration and quick thinking.

Cars, designed to pursue fame and fortune on the speedway, are valued at more than they win in the battle of cylinders. A low estimate of their cost would be $10,000 each. The owner generally splits the purse with the winning driver. First money is $20,000, so it is apparent that the entrant is most fortunate if he manages to break even, provided his car captures the major share of the prize money. There have been Indianapolis winners that cost in excess of $10,000, one maker stating he put $20,000 in each of two machines constructed for the 500-mile race. Maxwell burns about $75,000 on the altar of speed annually, a large part of which is spent in developing mounts for the Hoosier classic.

Two Foreign Drivers to Challenge America's Champions

TWO foreign drivers, both of whom were born in Italy, have crossed the Atlantic this year in hopes of duplicating the triumphs of Jules Goux and Rene Thomas, winners of the international sweepstakes in 1913 and 1914, respectively.

The invading pair is composed of Dario Resta, captain of the Peugeot team, and Jean Porporato, who will pilot one of the Sunbeams entered by the English maker.

Resta hails from the land of Garibaldi, but has resided in England so many years that he has become inoculated with British mannerisms of speech and customs. His first race was in 1907, when he piloted a Mercedes in a 40-mile contest at Brooklands, but was disqualified on a minor technicality after leading the field to the tape. Later, the same season, after capturing three big events at Brooklands with a 90-horsepower Mercedes, he went to France, where he won the prix de la France, run on the course in the vcinity of Boulogne.

Resta cast his fortunes with the English Sunbeam team in 1912. Showing the way to the field in the grand prix small car division for 950 of the 956 miles of grueling conflict, he was signaled by pit attendants to slow down. They thought he had a greater lead than he actually did and the error cost him the race, his teammate, Victor Rigal, finishing 1 minute ahead.

Last year his car was the first Sunbeam to finish at the Amiens grand prix, trailing three German Mercedes and Goux's Peugeot over the tape.

Porporato is a product of the European system which puts race drivers through a long apprenticeship before allowing them to be classed with the elite.

Porporato made a sudden jump into the limelight in 1908. The sporting inhabitants of the sun-scorched city of Bologna, in northern Italy, planned a couple of races on one of the fastest courses the world has known. Porporato, who up to then had been confined to local competition and test work for various firms, induced the Berliet company to loan him a chassis to race at his own expense. In the corner of the factory begrudgingly turned over to him, Porporato converted a standard touring chassis into a racing machine with such good effect that he came home an easy winner against a big field of competitors comprising most of the leading Italian firms.

Gregoire secured the services of Porporato and for 2 or 3 years kept him busy in both big races and local hill-climbs. During this campaign he was fourth in the 3-liter race at Boulogne in 1911. In 1913, a Paris newspaper man loaned Porporato a Gregoire racer which he had purchased some months before, the company having then quit the racing game. Porporato prepared the machine in a private shop and won first place in the 3-liter class of the grand prix de France, at Le Maas.

Last year he was in the employ of the Minerva company and drove that firm's Knight-engined cars in the 2-day Tourist trophy race on the Isle of Man. On each day he finished fifth.

Twenty-three Cars Will Face Starter in Hoosier Classic

Eighteen Entries Eliminated in Qualifying Trials for 500-Mile Race

ANDERSON, IN STUTZ, MAKING FIRST TRIAL IN ELIMINATION TESTS

By David Beecroft

INDIANAPOLIS, Ind., May 25—For the first time in the history of motor car racing in America, speed creations with a piston displacement limited to 300 cubic inches will meet on the Indianapolis speedway Saturday in the fifth annual international sweepstakes. The battle of cylinders promises to be the fastest in the history of the classic despite the fact that the number of starters is the least since the gasoline derby of the Hoosiers had its inception 5 years ago.

Twenty-three cars, nine representing three countries of the old world and fourteen carrying the colors of the United States, will be sent away by Starter Tom Hay at 10 o'clock in the morning, this skidoo number of entries having qualified in the elimination trials which closed late this afternoon. None of the 1915 contenders equaled the lap record of 1 minute 30.31 seconds, established by Georges Boillot in a Peugeot last year, but the average speed in the time trials was much greater than in 1914 and the prediction is common that the 500-mile mark of 82.47 miles an hour, Rene Thomas' average in his triumphant drive 12 months ago, will be broken Saturday.

Eighteen Cars Eliminated

As a result of the qualifying trials, which started last Friday instead of Thursday, as originally scheduled, because of a downpour, eighteen of the forty-one cars entered for this year's contest were eliminated. Several suffered from mechanical trouble and lack of preparation and others were not speedy enough to attain a speed of 80 miles per hour for one circuit of the 2.5-mile oval.

The American entries fared worse in the elimination trials than the mechanical invaders from across the Atlantic. Only three of the American entrants who nominated a team of three cars each, Stutz, Maxwell and Duesenberg, qualified. The Mercers, serious contenders in all the classics run in the past 3 years, fell by the wayside, their slowness being caused by lack of preparation and mechanical difficulties. The F. R. P. cars, a novelty among the entries as they are fitted with Knight motors, also were too slow to get in the field of starters while the Bergdolls, in charge of Willie Haupt, today were sluggish and stiff, showing need of more development.

The foreigners lost only two cars through the elimination trials, a Peugeot and a six-cylinder Sunbeam. Resta, Burman and Lecain qualified their Peugeots while John de Palma's lap at a speed of 87.2 miles per hour let the Delage in and gave France four starters. The two Sunbeams, sent over by the English maker for an American campaign, were fast enough to get into the exclusive set and Harry Grant's Sunbeam also finished among the chosen mechanisms. The two machines from the land of the Kaiser, the Bugatti and Ralph de Palma's Mercedes, had velocity to spare.

Two Cars in Repair Shop

There is a possibility that two of the twenty-three cars which qualified, the Bugatti and the Delage, will not be on the line when the starting bomb sounds as they are at present hors du combat as a result of accidents in practice and may not respond to the frantic first-aid treatment now being administered.

When the Bugatti was interned for repairs, Barney Oldfield, who had qualified it previously, immediately switched his allegiance from Kaiser Wilhelm to King George and closed a deal for the English

Times Made in Indianapolis Qualifying Trials

No.	Car	Driver	Time	M. P. H.
1	Stutz	Wilcox	1:31.0	98.90
2	Mercedes	R. dePalma	1:31.3	98.60
3	Peugeot	Resta	1:31.4	98.50
4	Stutz	Cooper	1:33.0	96.75
5	Stutz	Anderson	1:33.4	96.40
6	Sunbeam	Porporato	1:34.0	95.10
7	Sunbeam	Oldfield	1:36.0	93.75
8	Peugeot	Burman	1:37.4	92.40
9	Kleinart	Kline	1:39.8	90.20
10	Deusenberg	Tom Alley	1:40.0	90.00
11	Peugeot	Lecain	1:40.6	89.90
12	Sunbeam	Grant	1:40.8	89.30
14	Deusenberg	O'Donnell	1:41.2	89.00
15	Delage	John dePalma	1:43.4	87.20
16	Sebring	J. Cooper	1:45.4	85.50
17	Maxwell	Carlson	1:47.0	84.10
18	Maxwell	Orr	1:47.8	83.50
19	Deusenberg	Mulford	1:48.8	82.70
20	Maxwell	Richenbacker	1:49.8	82.00
21	Mais	Mais	1:49.8	82.00
22	Bugatti	Oldfield	1:50.4	81.50
23	Cino-Purcell	Cox	1:50.4	81.50
24	Cornelian	Boyer	1:51.0	81.10

DARIO RESTA INSPECTING PEUGEOT BEFORE HURLING CHALLENGE AT TIME

Sunbeam which Percy Graham, a British sportsman, was scheduled to drive. Graham in his three trials failed to get the speed out of the car that Barney did when he took the wheel and was a good enough sportsman to surrender the English mount to the veteran dirt track campaigner.

Delage Overturns in Practice

The Delage was wrecked when it somersaulted in practice Sunday, throwing its driver and mechanic in its mad loop-the-loop antics. Neither John de Palma or his helper sustained serious injuries and will be physically fit to chase the $50,000 in prize money Saturday.

As the result of the elimination trials, the hope of America regaining the international title lost to France apparently rests with the Stutz cars and drivers. There is no denying the Stutz is fast, all three machines showing better than 90 miles an hour in their trials, and in addition has long been noted for its stamina and staying powers. The Maxwells may prove a surprise although they did not show the speed in the elimination tests that the Stutz did. The Duesenbergs can be counted on to get away fast but whether they are strong enough to stand the gruelling grind is a question that will not be answered until the checkered flag drops Saturday. .

Three of the American qualifiers are dark horses, little being known of the Cino-Purcell, the Mais Special and the Sebring. The Kleinart, Art Klein's reconstructed King, already has been baptized in the fire of speedway competition, burning up the track in the early stages of last year's race but failing to finish. The Cornelian, the baby of the field, may not be fast enough to annex first honors but may haul down a piece of the prize money as it is extremely light and consequently not hard on tires.

Past Victors Not in Field

Several faces familiar to the speedway fans will be missing Saturday and not a single winner of any of the four previous races will be on the starting line when the cars are sent away. Ray Harroun, who took the 1911 classic, is managing the Maxwell team; Joe Dawson, who turned defeat into victory in the last three laps of the 1912 event, will watch Saturday's chase from the pit; and Jules Goux and Rene Thomas, who captured the major share of the prize money in 1913 and 1914 respectively, are in the European war zone. Several other veterans of the gasoline circuit will be absent, including Caleb Bragg, Teddy Tetzlaff, Billy Knipper, Charley Merz and the flock of aliens who were such factors in the last two international sweepstakes.

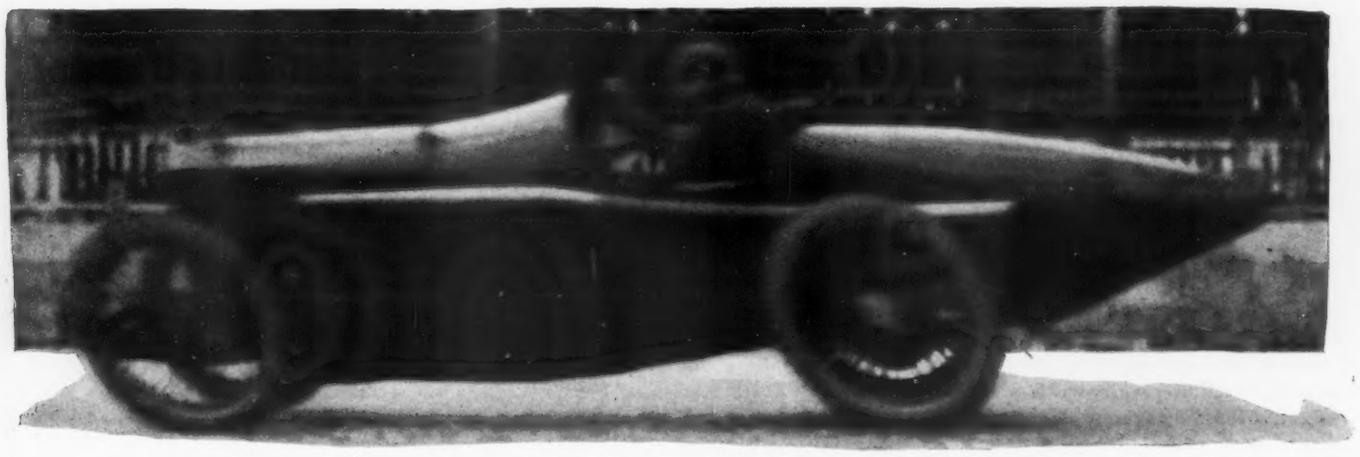
New drivers have taken their places, however, two from Europe and several native sons. Resta, who recently won the grand prize and Vanderbilt cup, is a real contender and Porporato, who is handling a Sunbeam, is the other foreigner who has made racing history abroad. Among the American neophytes of speed are Eddie O'Donnell, the Duesenberg pilot; Joe Cooper in a Sebring, Mais in a car of the same name and Cox at the wheel of the Cino-Purcell.

Speedy Getaway Anticipated

Saturday's start gives promise of being one of the fastest ever seen on the speedway. In the front row will be four of the fastest cars in the land, two Stutzes, a Mercedes and a Peugeot, piloted by such experts as Wilcox, Cooper, de Palma and Resta. Behind these will come a second line of equally stellar racers—Anderson in Stutz, Porporato in a Sunbeam, Oldfield in a Sunbeam and Burman in a Peugeot. With these eight past masters in the two front rows, there should be the greatest speed battle for leadership ever seen on the Indianapolis speedway.

Today, the American car record for the 500 miles is held by the National, made in 1912, when Dawson averaged 78.70 miles per hour. In 1913, the fastest American driver was Wishart in a Mercer, who averaged 73.49 miles. Last year, Barney Oldfield put the American mark at 78.15 with a Stutz. A new American record is looked for this week.

A protest was lodged with the A. A. A. contest board this afternoon by the Peugoat Auto Import Co. against a decision made by the referee requiring Burman's entry to start as a Peugeot or not at all. Burman's car originally was a Peugeot, but as several parts have been replaced during the last year, the Peugeot people believe that under the rules it should be



PORPORATO, THE ITALIAN, PLACES THE SUNBEAM AMONG THE FIRST EIGHT CARS TO QUALIFY

STARTER TOM HAY CONSULTS WITH PORPORATO BEFORE SENDING SUNBEAM AWAY

entered as a Burman special rather than a Peugeot.

The apparent reason for the appeal from the referee's decision is that by classing Burman's entry as a Peugeot, one of the four Peugeots entered was not allowed to start, the A. A. A. rules allowing only three cars of any one make to compete. A decision is looked for in a day or so.

Under this same ruling, only the three fastest of the four Sunbeams entered will be allowed to start. The same also applies to the Harroun special, in reality a Maxwell.

The Duesenberg entries, which were late to reach the speedway, made good in their early qualification. Alley set the qualifying pace for his team at 90 miles per hour. O'Donnell was next in 89 and Mulford, who reached the speedway this morning, put the third over at a speed of 82.7 miles per hour. Mulford had entered a car of his own make, but it was not shipped from Brooklyn, since it was not ready for the race.

There were several other entries that did not appear for qualification, including the Shambaugh and Cino.

Predict Faster Race Than Ever

Although the field of starters this year is smaller than last, it will give the faster cars a better chance in the earlier stages of the race. The rail birds are placing the possible mark at 85 miles an hour if the weather is cool and average luck favors the drivers.

The qualifying trials were completed at 5:30 o'clock and the twenty-three cars that are to start in Saturday's race were definitely known for the first time.

During today, many eliminations took place. The team of three new Mercer racers were scratched, as two of them broke connecting rods and tore holes in the cylinder castings and crankcases. The cars were new, some of them having done scarcely 100 miles before reaching the speedway. The company was not able to get the desired steel for the rods.

There also was keen disappointment when none of the team of three Porter-Knight sleeve-valve cars qualified, due to piston rings breaking. The cars were late in reaching the track and the drivers did not have a chance to work out the new motors. New piston rings were made, but failed to reach here in time.

First Six Cars Very Speedy

This year's field gives promise of cutting last year's record of 82.47 miles per hour for the 500 miles. While Boillot's Peugeot's qualifying record of a lap at 99.85 miles per hour was not bettered, or even equalled, there is this year a group of five or six cars faster than the same number of leaders a year ago.

First honors in the 1915 trials go to Howard Wilcox in one of the new sixteen-valve Stutzes, who made the lap in 1:31, a speed of 98.9 miles per hour, the second fastest circuit ever made on the speedway. This mark, made Sunday afternoon before an attendance of 7,500, was the most popular event of the 5 days given over to qualifying work.

Close behind the Stutz came Ralph de Palma in the grand prix Mercedes that placed second in France a year ago and captured the two Elgin road races last fall. The Mercedes' time was 1:31.3, but $\frac{3}{10}$ second slower than Stutz, and a speed of 98.6 miles per hour. De Palma made his lap on Saturday.

Resta Pushes the Mercedes

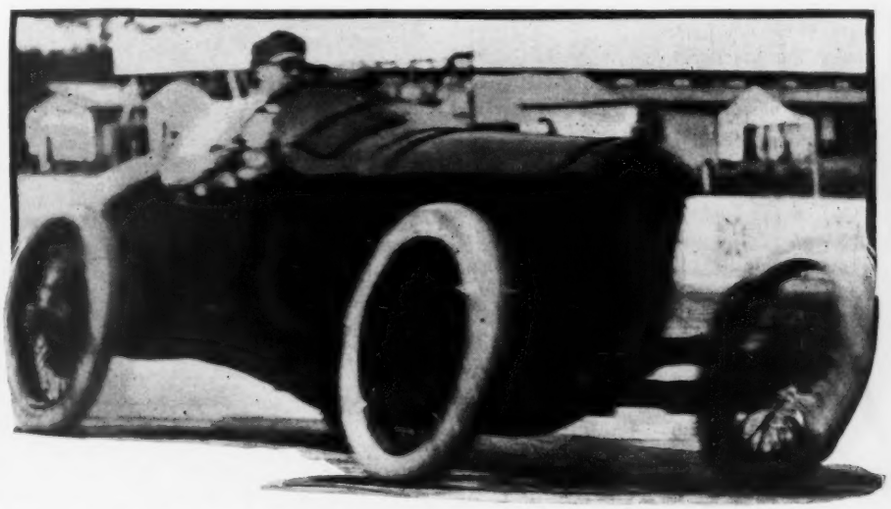
De Palma had but a narrow margin on second place, as Resta sent his Sunbeam around in 1:31.4, just $\frac{1}{10}$ second slower than his fellow Italian. Resta drove the track well, but shut off on all four turns, whereas de Palma did not throttle down on any of them. Resta's car was designed to carry two extra tires on the rear for road racing and without these on the speedway, the tail is a little light and skids on the turns.

Fourth and fifth places were taken by the other two Stutzes, driven by Earl Cooper and Gil Anderson. Cooper made his best lap in 1:33, a speed of 96.75 miles per hour, and Anderson's time of 1:33.4 was at a pace of 96.4 miles per hour.

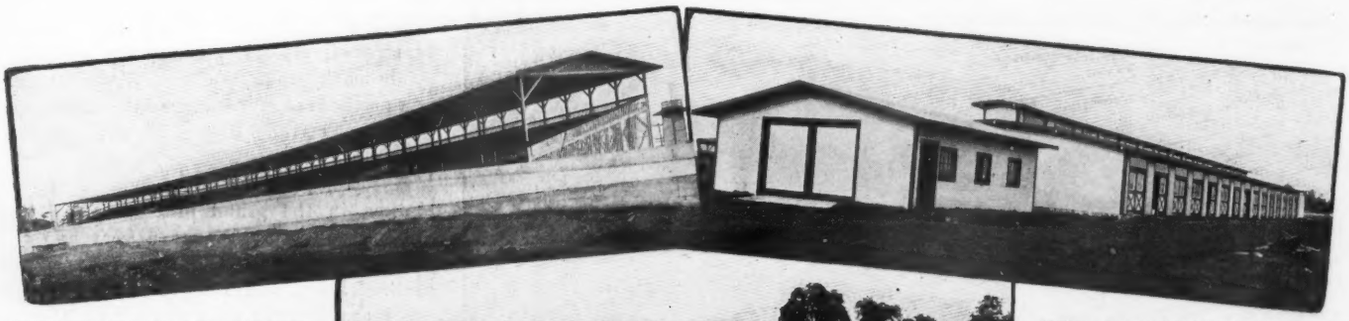
The work of the three Stutzes qualifying among the first five cars is a most creditable performance and stands as a record. The Stutz company set out in a businesslike way to build new designs to meet the 300-cubic-inch requirements and has made good. The cars were completed early and have been well worn in.

Porporato, a new foreign driver, put his Sunbeam into sixth place in 1:34.6, a pace of 95.1 miles per hour. Oldfield took seventh place in a Sunbeam after his Bugatti was out. He drove the lap in 1:36 or 93.75 miles per hour. Burman landed his Peugeot eighth in 1:37.4, or 92.4 miles per hour.

Ninth place was taken by Klein in the

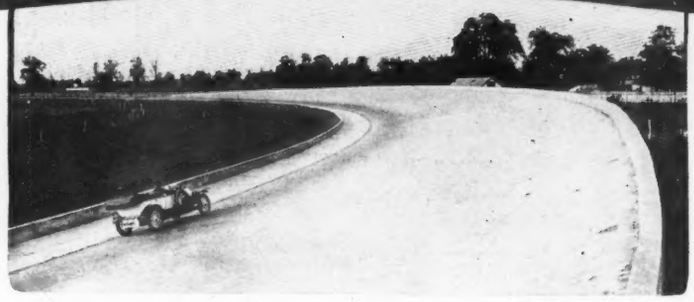


DARIO RESTA'S LAP IN 1 MINUTE 31.4 SECONDS MAKES HIM A FAVORITE IN SATURDAY'S RACE



NEW GRAND STAND ERECTED ON SOUTHEAST TURN

NEW GARAGES CAPABLE OF HOUSING THIRTY CARS



NEW EXTENSION AND SAFETY WALL ON INSIDE OF TRACK

Kleinart in 1:39.8, or 90.2 miles per hour. Tenth place was taken by Tom Alley in a Duesenberg in 1:40 flat, a pace of 90 miles per hour. These were the only cars to qualify at a speed better than 90 miles per hour. Last year eight cars qualified at better than 90 miles an hour as compared with nine this year. Last year the motors were 450 cubic inches or under and this year they are 300 inches or under. The smaller motors have shown up better than was expected.

Barney Oldfield qualified the Bugatti in 1:50.4, a speed of 81.5 miles per hour, but later, when warming up for a second trial, burned out a connecting rod, which destroyed the side of the crank case. The car was withdrawn.

The Emden entry from Iowa made a lap in 1:42, or 80.3 miles per hour, but the driver, due to lack of racing experience, was not permitted to compete and the entry was withdrawn.

It was hoped that the Delage entry, driven by John de Palma, a brother of Ralph, would qualify. It did in 1:43.4, or 87.25 miles per hour, on the first trial, but when taking his second trial on Sunday afternoon, he skidded entering the home stretch and struck the inside wall, breaking the front end of the frame but not seriously injuring the driver and mechanic. The car skidded on the curve and after turning around twice, rolled over three times, without damaging the motor, gearset or transmission parts.

Three Mercers Scratched

The three Mercers did not have much opportunity of practising. Only one of them came out to qualify. It was driven by Ruckstell and made its lap in 1:47.4, or 84.6 miles per hour.

One of the best qualifying performances was that of the small Cornelian with its pigmy motor of 116 cubic inches and weighing less than 1,000 pounds. Driven by Boyer, it made the 2.5-mile lap in 1:5.1, or 81.1 miles per hour, and was the first car to qualify, taking its trial on Thursday, and the only car to qualify on the opening day.

Although three Bergdoll cars were entered, only one reached the speedway. It arrived before noon today and in its trials failed to qualify, making but 75.95 miles per hour. It was driven by Willie Haupt, who has had a long experience in racing but who was unable to get the motor to fire regularly, missing all the way around the circuit.

Three Peugeots in Field

Four Peugeots were entered, one being named as a Burman special. As it was a Peugeot design, but with cylinder castings made in an American factory, it was ruled to be a Peugeot entry. This meant that the three fastest only would be allowed to start. Two of these cars are larger than the other two, Resta and Burman driving them. It was a fight between Babcock and Lecain, driving the smaller two, to see which would qualify. Babcock first qualified. Lecain in his second trial made the lap nearly a second better than Babcock and qualified in 1:40.6, or 89.5 miles per hour. This Peugeot is 183 cubic inches as compared with 274 cubic inches in the cars of Resta and Burman.

In qualifying, each car was required to make a lap of the 2.5 mile brick track at 80 miles per hour or over. Each car was given three trials, if necessary. The fast cars took their first trials at 90 miles, or a little over. In their second trials began the battle for positions in the front line of starters on race day, it being considered a big advantage to get in the first row. The battle for position in the second line of starters also was spirited.

LIMBERG, GRANT'S TEAMMATE, WHO FAILED TO QUALIFY THE SUNBEAM

The Bergdoll's best time was 1:58.5, or considerably above 1:52¼, which is the lap time for an 80-mile average. DeVore, in one of the Porter-Knights, made the lap in 1:53.7, or a little under the 80-mile-an-hour gait.

Upon their arrival in Indianapolis, the representatives of the American Automobile Association had several important decisions to make regarding the elimination trials and the race. First of all was the question whether or not one driver could qualify more than one car, as Bob Burman did last year, when he put Louis Disbrow's Burman Special in the field of starters as well as his own after Disbrow had failed to get any speed out of his mount on two laps of the oval. The officials decided that either the pilot, named to drive the car in the race, or his relief could qualify the entry.

Front Axle Rule Modified

The much protested ruling that all cars should be fitted with new front axles 2 days prior to the contest was amended to refer only to steering arms and spindles. This edict of the speedway management, issued when the entry blanks were mailed, was most distasteful to the drivers of foreign cars who are unable to get the necessary parts from the factory because of the European war.

In order not to evade the rule, Bob Burman was forced to spend $300 for the construction of a new front axle for his Peugeot, being informed by the speedway management several months ago that it would make no exceptions in the enforcement of the safety first provision. Bob might have saved the $300 had he taken a chance and figured that the rule would be amended.

There is going to be a race at the speedway Saturday in spite of the small field of starters and a new chapter in speed history is to written.

Foreign Drivers in 1914 500-Mile Race Minions of Moloch

PARIS, May 8—When Memorial day breaks there will be a score of uniformed Frenchmen whose thoughts for a few moments will break away from war and its accompaniments to whisk across the Atlantic to the oval track where the starter is sending away the racing cars for the 500-mile grind which will determine the ownership of the Indianapolis sweepstakes. For a few minutes there will be a feeling of disappointment, perhaps a little despondency, then a shrug of the shoulders and the work in connection with the great war will go on.

Goux's Victory Fires French

It took 2 years to make the Frenchmen enthusiastic in American speedway racing. When Jules Goux came home after the 1913 race, his pockets filled with dollars and his heart aflame, he fired not only the members of his own team, but a dozen of his companions, with a desire to go across. After last year's successful European invasion, every man swore he would be back again in 1915, and a dozen others who only knew of Indianapolis by hearsay, had pledged themselves to line up behind the pilot car.

Then Germany sent her mailed fist crashing into the France which did not want to believe in the possibility of a war, and with that blow reduced racing and racing cars to a triviality.

"Damn them," said a race driver at Porte Maillot. "They have upset everything just when the outlook was brightest; if only we get it over in time for Indianapolis, I do not mind."

Now that same driver is wondering vaguely if the job will be through in time for the 1916 race.

With the exception of last year's winner, all the 1914 European team is or has been within sound of the guns. Rene Thomas thought that as an aviator and an expert driver there would be a job for him in the army. He offered his services again and again, but because a motorcycle accident had kept him in hospital during the 12 months he should have been receiving military instruction, the army refused to look upon him as an eligible candidate. Finally, disgusted at the red-tape procedure, Thomas took charge of a shop engaged in repairing damaged army motor cars.

Robert Laly, the little Parisian who held the stove pipe of the Delage when it walked off with the first prize last year, was swooped up with the first batch of infantrymen. The army looked upon him as a man to put behind a gun, not as a mechanic and experienced motorist. With one of the first drafts, he went on the eastern frontier. In the great struggle on the Marne he got into a tight corner; when the roll was called, he failed to respond. A few weeks later a brief message was received: "Am a prisoner; send me some money." It was sent, but for 5 months no reply has been received. Laly was a bit adverse to discipline. Probably he spoke his mind too freely, and is now paying for it by solitary confinement in some German prison.

ALBERT GUYOT, THIRD IN 1914 RACE, ON THE LOOKOUT AT MOUTH OF FRENCH TRENCH

Arthur Duray and Henry Matthys, who astounded the public by the way they moved up with the Baby Peugeot last year, felt it time to roll up their sleeves when their native Belgium had been invaded. The army doctors looked suspiciously at Duray, for although he has a burly body it is marred by a silver knee acquired in an aeroplane accident. But Duray would not be turned down. He called at the recruiting offices every day for a week until at last they accepted him, and now are glad of it, for army motorists with Duray's experience are valuable. Matthys slipped in easily and was at once attached to an officer's car.

Guyot Saves General's Life

Albert Guyot got the call to report at barracks when he was trying to get over his disappointment in the French grand prix. Without waiting to say good-bye to his family, whom he has not seen for 10 months, he joined his regiment as a sergeant. In a few days he was appointed driver to the general commanding the Fifth Army Corps. In an ambush prepared by the enemy, he saved his general's life, and as a reward, has had to spend the entire winter in the Argonne, sleeping in a house with only half a roof. Seuws, who watched the oil gauge on Guyot's Delage, was given service in one of the army provision depots.

Jean Chassagne, ex-sailor and Brooklands' 12-hour record holder, holds the military rank of marechal-des-logis. They kept him for several months in a fort dominating the Swiss frontier, at which post there was no necessity to do more than run the guns out and make a pretence at firing them. After a lot of difficulty, Chassagne got a transfer to tune up aviation motors at the Clergot works. When the Sunbeam factory was taken over by the British war office, he was given a further transfer to tune up that firm's 12-cylinder aviation motors. He has cast off the uniform, but is none the less a soldier.

Jules Goux had a similar experience at the outbreak of the war. They put him in a fort on the eastern frontier, but when the military governor of Belfort needed a driver, Goux was suggested and accepted.

Boillot Pilots Officer's Car

Spectacular Georges Boillot got his call 2 days before war actually broke out. He was put on the headquarters staff and expected that he would have to drive General Joffre, but the French chief cast his eyes on one of his officers, and although Boillot has been attached to the staff since the beginning and has driven its various members, he has not been in the direct service of the head of the army.

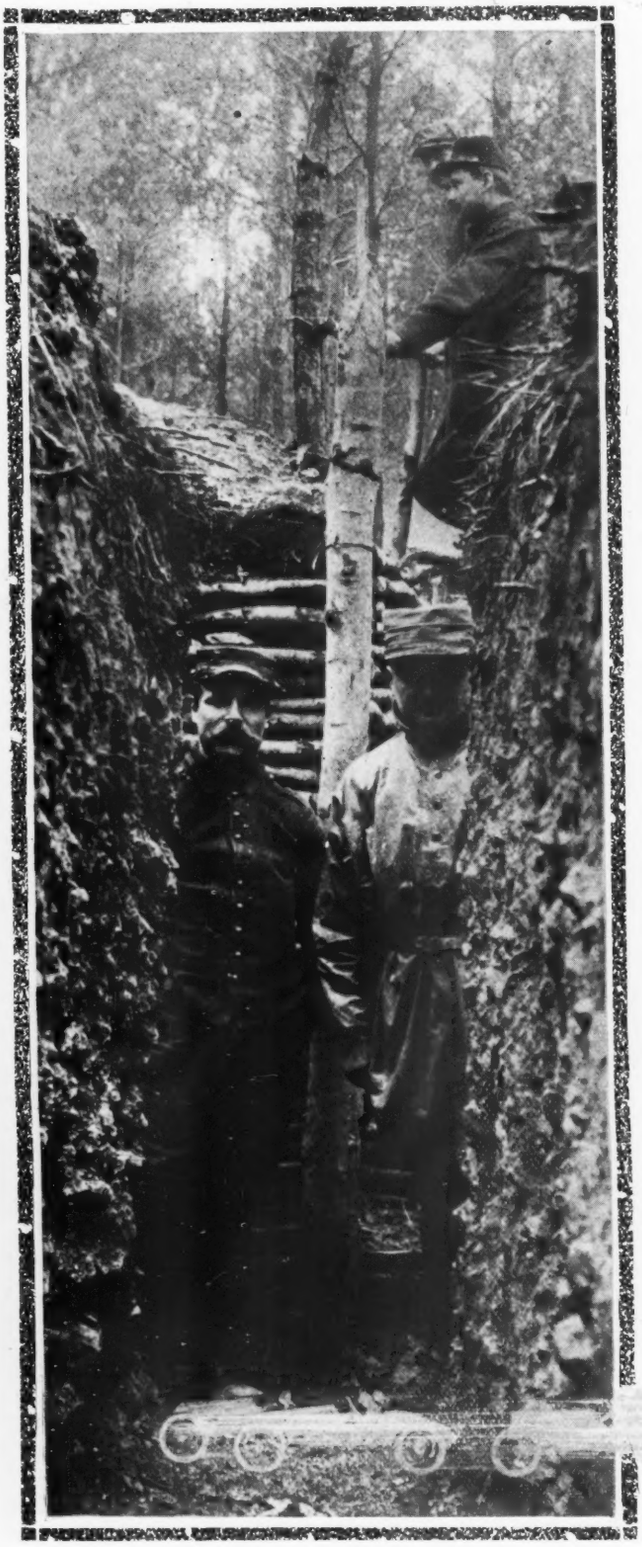
Charles Faroux, who managed the Peugeot team when Goux snatched the first prize, volunteered with his new Rolls-Royce car during the first fortnight of the war. They accepted him, and after keeping him on despatch work between Paris and the front for several weeks, he was attached to the officers' staff near Verdun. W. F. Bradley, the 1914 foreign team manager, wore the uniform of an English private in all the early fighting along the Aisne.

Mystery surrounds the whereabouts of Christiaens, the Belgian Excelsior driver. When the Germans invaded Belgium, Christiaens was at his home in Brussels. It was reported that he had joined the Belgian aviation corps, but whether he is alive or has fallen into the hands of the enemy nobody can say. Friedrich, the driver of the little Bugatti, has also been lost in the turmoil of the war. Although having spent nearly all his life in Alsace, he claimed French nationality and served in the French army. Whether he succeeded, like Mr. Bugatti, in escaping into France when the war storm broke, is one of the many mysteries to be cleared up when peace is declared.

Alien Speed Stars in the Grip of War to Ride in Memory

May Twenty-ninth in the Trenches

by J. C. Burton



The dawn is veiled in gloom today
And wild desires course through my brain;
I seek a land that's far away,
I long to drive the bricks again;
I long to hug the speedway's rim,
To stake my life on bolt and tire,
To leave the trench of horrors grim—
The haunts of slaughter, pillage, fire.
Amid the deaf'ning din of war,
I hear the racing motors roar.

My lust today is not for gore,
I do not chant a hymn of hate;
I only wish to drive before
The throng that hailed me once as great.
I ask a furlough for a day
To ride in mad pursuit of fame,
Where mounts of steel careen and sway,
Where thousands cheer the victor's name.
I don't endorse the coward's creed,
But give me just one taste of speed.

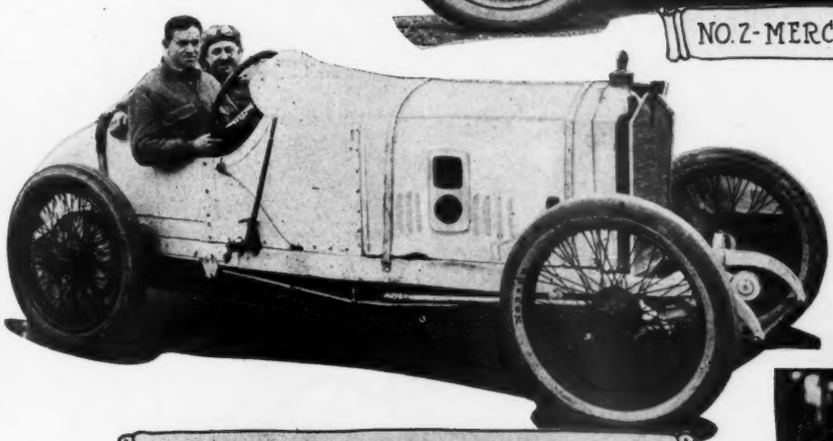
I crave the thrills that I once knew,
I want to fight a thing of steel,
To join the Mercurian crew
And tilt the leader, wheel to wheel.
I once was hailed as king of speed,
My daring made the packed stands groan;
Today, the bugle's call I heed,
A serf of Mars, I am unknown.
The starting bomb is not for me,
I only drive in memory.

I've planned my race; I've won it, too—
The race in which I cannot start—
My phantom car is fast and true,
The engine's throb is in my heart.
I hear the smoking exhausts bark
And then—a fellow comrade's scream;
Some German bullet's found its mark—
I ride no more, flown is my dream:
I must not think of jack or wrench,
I'm but a soldier in a trench.

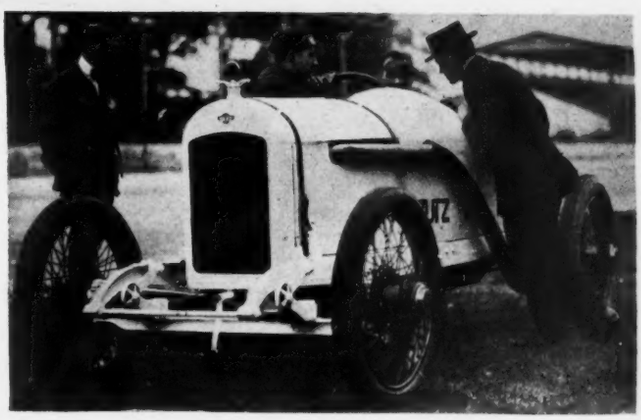
How They'll Look When They Line Up for The Start

NO.1-STUTZ-WILCOX-*America*-98.9 M.P.H.

NO.2-MERCEDES-RALPH DE PALMA-*Germany*-98.6 M.P.H.



NO.3-PEUGEOT-RESTA-*France*-98.5 M.P.H.

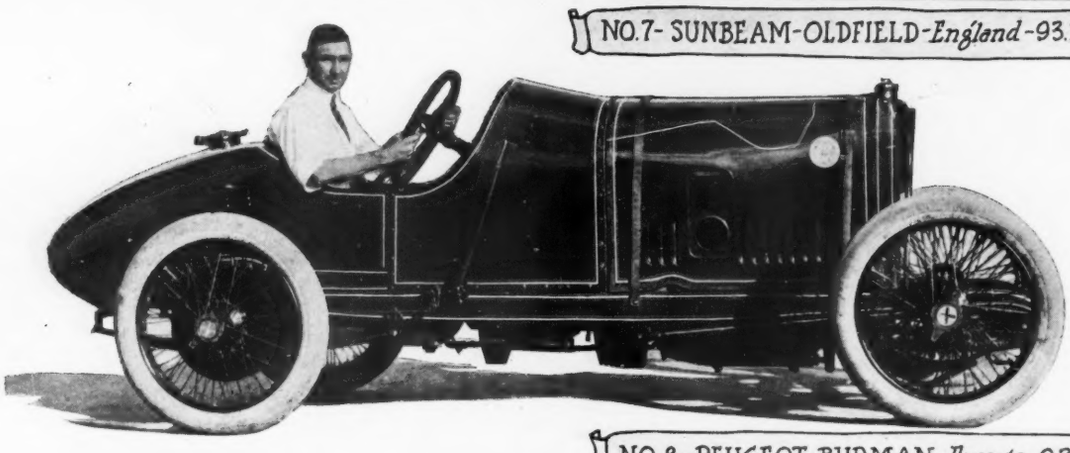


NO.4-STUTZ-COOPER-*America*-96.7 M.P.H.

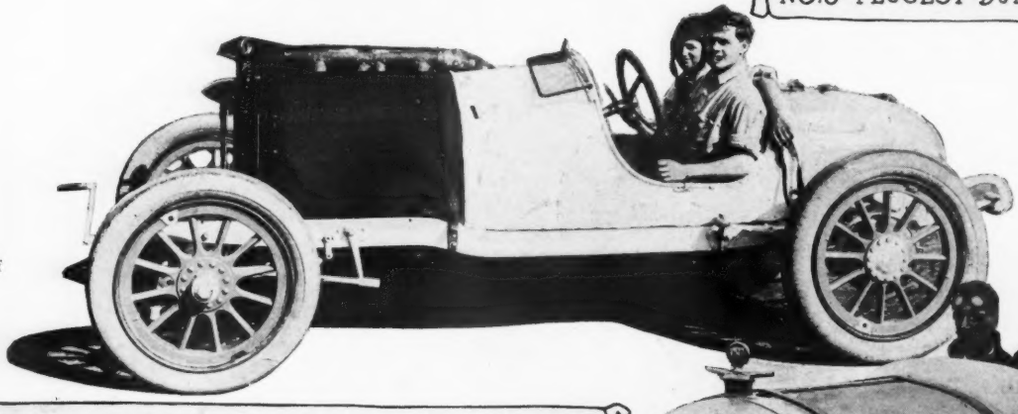
NO.5-STUTZ-ANDERSON-*America*-96.4 M.P.H.

NO.6-SUNBEAM-PORPORATO-*England*-95.1 M.P.H.

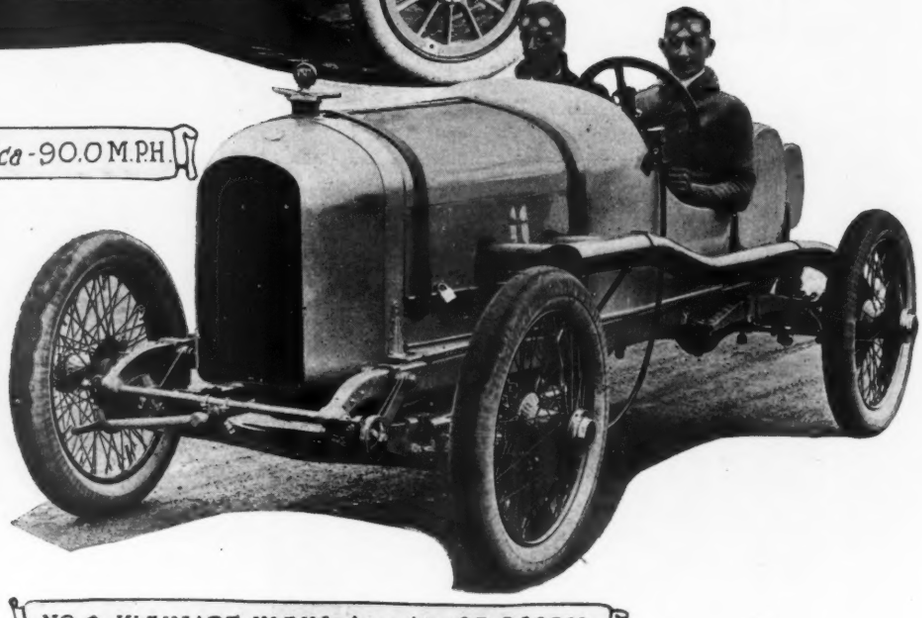
NO.7- SUNBEAM-OLDFIELD-*England*-93.2 M.P.H.



NO.8-PEUGEOT-BURMAN-*France*-92.4 M.P.H.



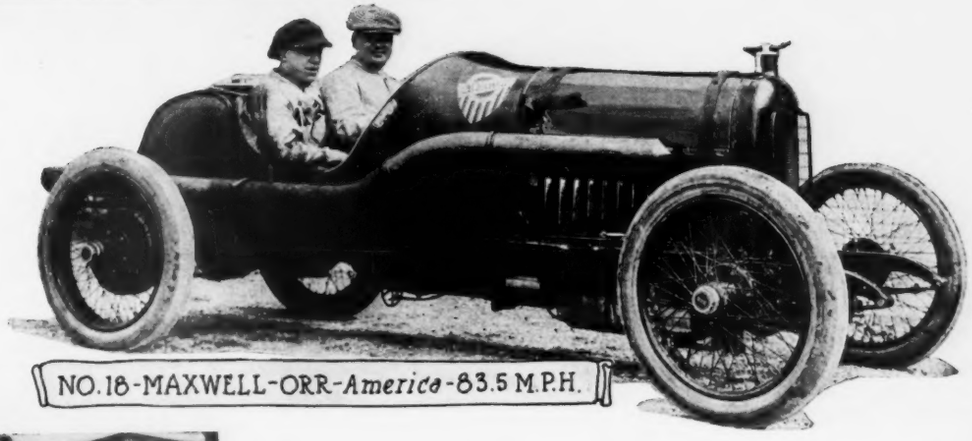
NO.10-DEUSENBERG-ALLEY-*America*-90.0 M.P.H.



NO.9-KLEINART-KLEIN-*America*-92.0 M.P.H.

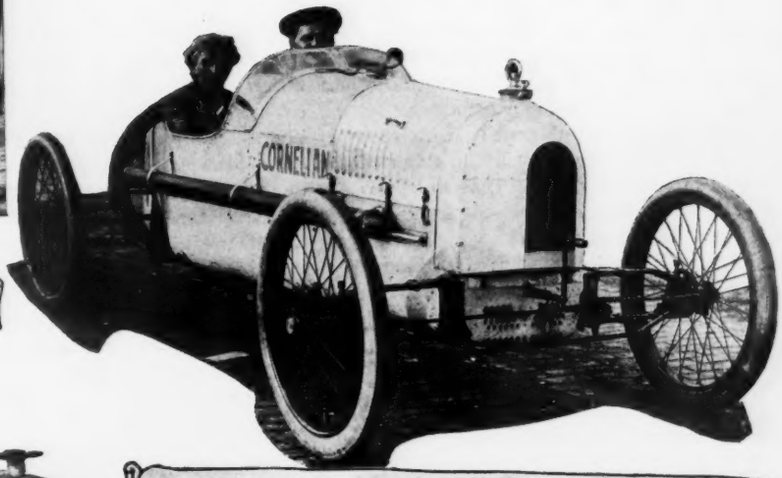
NO.16-SEBRING-J.COOPER-*America*-85.5 M.P.H.

RALPH MULFORD

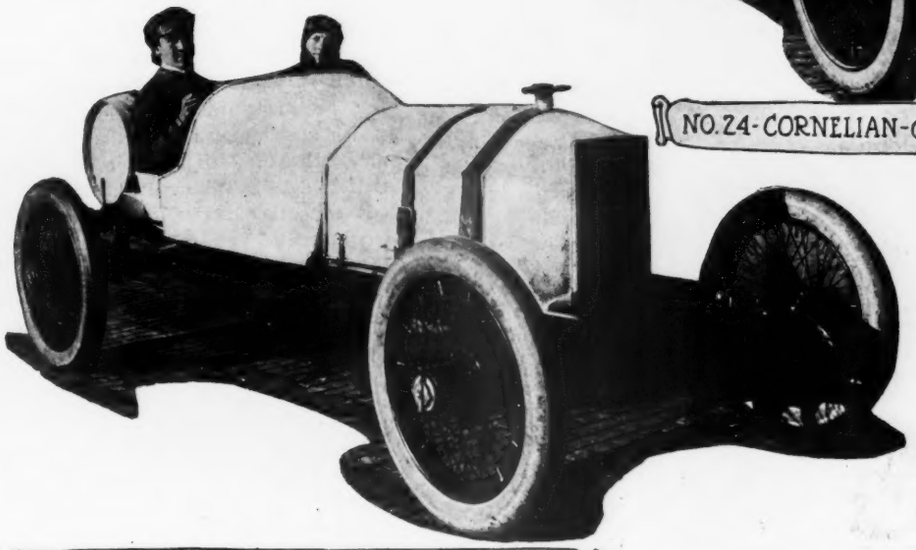


NO.18-MAXWELL-ORR-*America*-83.5 M.P.H.

NO.20-MAXWELL-RICKENBACHER-*America*-82.0 M.P.H.



NO.24-CORNELIAN-CHEVROLET-*America*-81.1 M.P.H.



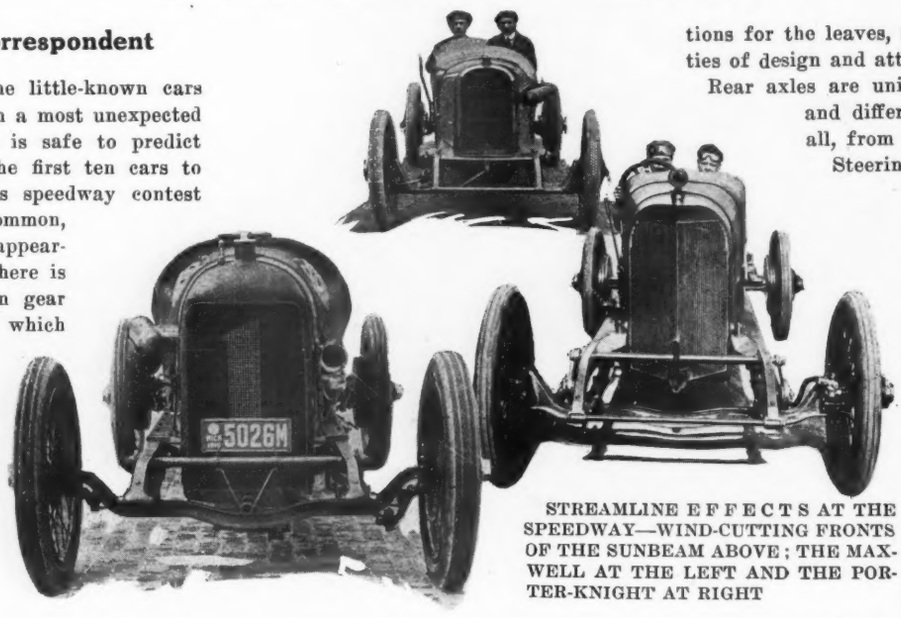
NO.23-PURCELL SPL.-COX-*America*-81.5 M.P.H.

Looking at 500-Mile Race from Under Hoods of the Cars

Technical Description of the Machines That Will Make Speed History on Colossal Brick Saucer at Indianapolis

By a Staff Correspondent

UNLESS one of the little-known cars should show up in a most unexpected and unlikely way, it is safe to predict that the motors of the first ten cars to finish the Indianapolis speedway contest will have much in common, as far as external appearance is concerned. There is not much variation in gear ratio amongst those which are expected to rank high in the prize list, so there is little to choose in the number of explosions per minute of each motor, which means that high explosion pressure and small windage ought to be the deciding factors in the flight over the red bricks.



STREAMLINE EFFECTS AT THE SPEEDWAY—WIND-CUTTING FRONTS OF THE SUNBEAM ABOVE; THE MAXWELL AT THE LEFT AND THE PORTER-KNIGHT AT RIGHT

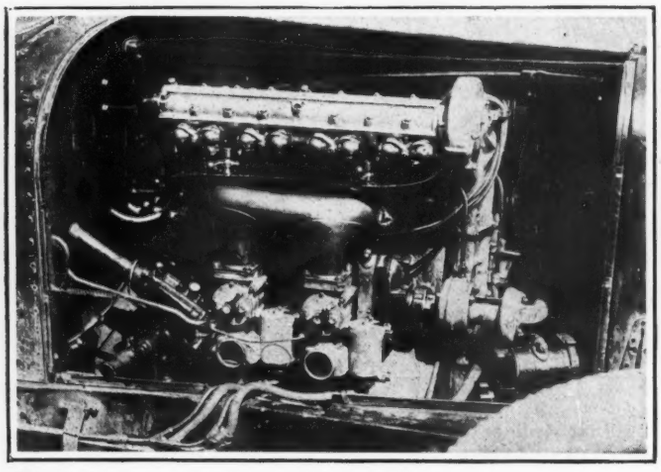
It is not far from the truth to say that the coming race will be one of acceleration, a test of the power of the cars to get away from 80 up to 100 miles per hour, for there will not be many that can do the whole circuit on open throttle. The least sluggishness in getting away as the straight-aways are entered is liable to put a car out of the first bunch and this means that weight has a good deal to do with deciding the victor.

Motors All One Family

Amongst the less-known cars there are exceptions, but all the cars that are household words to the speedway enthusiast have motors with overhead valves. Most of these are of the multiple valve type, too; that is, they have three, or usually four, valves per cylinder. The purpose of this is to give the maximum of opening with the minimum lift and weight of valve.

These overhead valve motors are a new feature for racing in America, not because they have not been used before, but because never before has there been so many different cars using the same general scheme in conjunction with all the other kinks of high speed motor work which have been learned from other kinds of racing engines.

In the chassis, however, we find little that is abnormal and practically nothing that is new. Of course in racing on a track, the clutch and gearset are not used except at the start, and then only for an instant, so all that is necessary in these parts is that there shall be as little friction as possible. Spring design is a problem, but it is noticeable that this year most of the cars hold the track well. There are a few cantilever springs, the majority being half-elliptic. Many springs are bound up tightly with strong twine, so as to deaden their rebound, and still shock absorbers are the rule. By comparison with road practice, the front springs are short and the rear ones about normal in length, so the good supension is traced to proper proportions for the leaves, rather than to novelties of design and attachment.



SUNBEAM FOUR-CYLINDER MOTOR SHOWING THE DOUBLE CARBURETER AND INTAKE

Rear axles are universally bevel-driven and differ very slightly, if at all, from touring car practice.

Steering gears are seldom normal, in that they swing with much less effort, due to the use of generous ball or roller bearings and careful experiment with the lengths and proportions of levers and linkage. It is to be observed that wabbling or flapping front wheels are the exception, whereas a few years ago they were the rule.

A more or less streamline shell characterizes practically all the foreign and many of the American cars, while those which do not have rounded tails have tapered hoods and smoothly curved cowls, making a streamline job for the entering end. Whether the tail pays or not is a much debated question and it certainly is not an advantage should there be a strong side wind. On the other hand, it cannot fail to help a little if the atmosphere is still. Thus it is a ticklish matter for decision, especially if the few pounds of extra metal in the tail is considered. There is no doubt whatever that a narrow body is good, and most of the new American jobs have the minimum of width that will accommodate the driver and his mechanic.

Salient Points of Each Starter

The table of dimensions and mechanical detail on pages 22 and 23 should be used for reference rather than these notes, which are intended to point out the characteristics of design rather than the statistical detail. Taking first the new American cars, the Maxwells were described in the March 25 issue of Motor Age; the Porter-Knights in the issue of May 6; Burman's motor in the issue of May 13 and a few particulars have been given about the others from time to time. In the following, it is not proposed to repeat these accounts in full but to mention only the salient points of each.

The Stutz team of three cars is in accordance with up-to-date racing science. There are four valves per cylinder operated by rockers from a single central camshaft, which is driven by spur gearing at the front end. Ball bearings, three in number, are used for the crankshaft. The

pistons are of a remarkably light aluminum alloy.

Very considerable secrecy has been observed concerning this new Stutz creation, but there is a well-accredited rumor that the motor is of a type new to Stutz practice. In appearance, the engine bears a strong resemblance to the Mercedes, having the same sort of camshaft case with a good deal of bronze work in it. The aluminum casing for the train of spur gears at the front end looks very small, as compared with Peugeot practice, doubtless because there is only one camshaft to drive instead of two.

Stutzes Are Narrow

The bodies of these cars are very narrow and the radiators appear to be deeper than usual, so presumably the amount of water carried is greater than that used for most cars on the speedway.

The Stutz chassis follows normal lines and is mainly conspicuous for absence of small rods, levers and such. Although it has no regular streamline tail, the radiator, hood and cowl are shaped to offer the minimum of resistance, and a large dual tank for gasoline and oil offers flat sides and a rounded top to carry the draft away over the stern. It is noteworthy that this thoroughly American job also is using an entirely American carbureter in the Stromberg; in fact, it is only the Bosch ignition that owes anything to foreign business interests and in this case the foreign nature is overcome by American manufacture. The Stutz ranks high in the estimation of qualified judges of form, and they are expected to give a very good account of themselves on the great day.

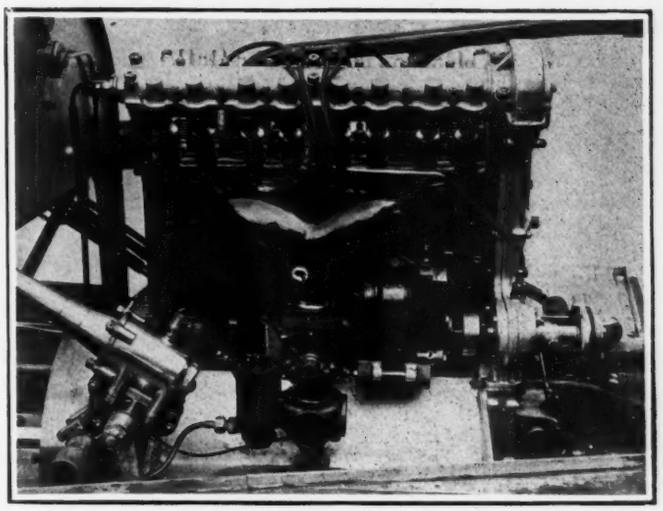
The Maxwell motor has overhead valves, of course, but they are not inclined, standing vertical with the stems upward. There are four per cylinder, operated by rockers from a single central camshaft, the valves being staggered so as to make room for enough cams.

A peculiarity of the motor for these days is that there is no external flywheel unless the clutch be counted as such, since the crankshaft is a counterbalanced structure in which cranks and flywheels are combined. This has been used before for Maxwell motors, but hitherto the crankshaft was all one piece, whereas it is now divided in the middle to allow the mounting of a central ball bearing. The rear portion of this compound crankshaft has a spliced end, which slips into a corresponding female socket inside the center ball bearing. Each flywheel portion has counterweights to balance the crankpins and the rotating parts of the connecting rods.

For the pistons, an aluminum alloy is employed, the weight being thereby cut to 15 ounces, as against about 2 pounds for cast-iron of similar dimensions, the particular metal used being Magnalium. For other parts, such as brake spiders and brackets, the choice has been macadamite, another alloy of great strength and low specific gravity.

Maxwell Oiling System

Lubrication is cared for by two independent systems, the simplest being purely splash. This is intended only for the emergency and is under the control of the mechanic. The main system on which most reliance is placed consists of a low pressure force feed taken to each of the main ball bearings, the overflow thence being caught inside sheet-metal disks of flat-cup form bolted against the balance weight or flywheel masses. Oil is thrown centrifugally to the limits allowed by these inverted saucers and conducted through holes in the crankpins to the connecting-rod bearings. There are, of course, separate leads to sundry other parts of the motor.



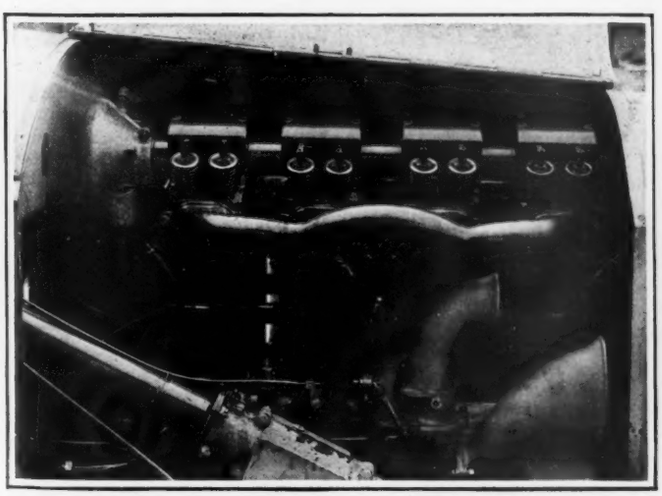
INTAKE SIDE OF PEUGEOT MOTOR SHOWING THE OVERHEAD VALVE OPERATION

Maxwell is alone in using helical gearing for driving the overhead camshaft, instead of a spur-gear train or bevel gearing.

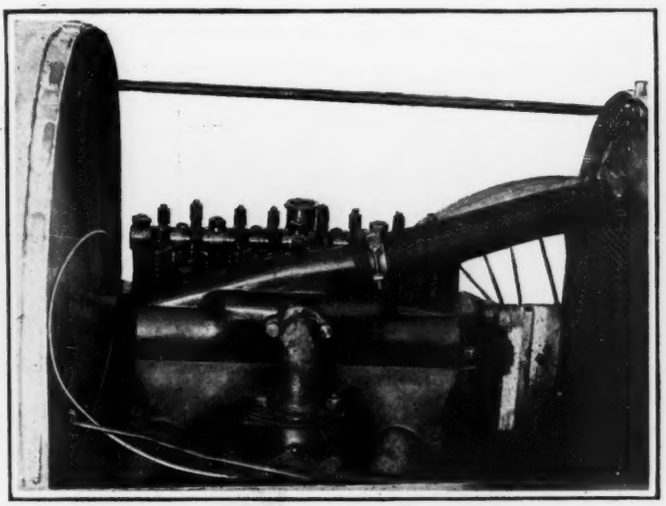
Duesenberg Motor

A well-known motor appears on almost half the other American entries, excepting the small jobs, this being the Duesenberg. This engine is the only example of specialized racing motor manufacture in the world and is quite successful. The overhead valves, two per cylinder, are arranged horizontally and along one side of the cylinder block, while the camshaft is situated in the usual position in the crankcase. Instead of using long push rods and short rockers, as has been done in the French Delage motor of similar idea, Duesenberg uses very long rockers with the upper ends bearing against the valves and the lower extremities against the cams. This makes a very neat-looking motor and many cars using this engine have shown high speed capabilities.

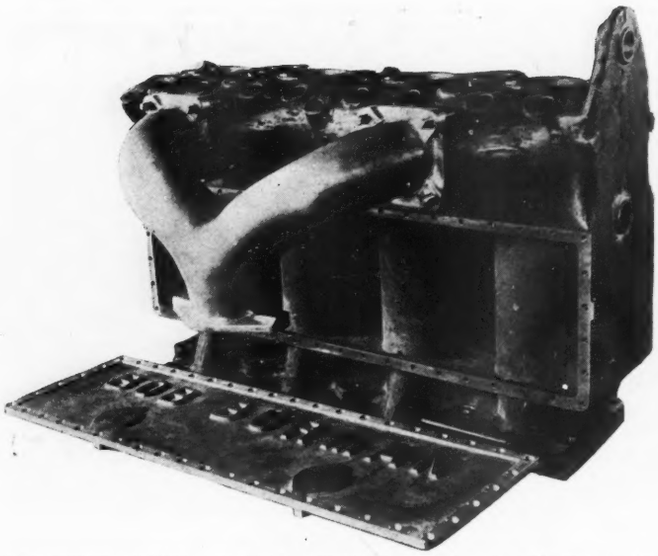
The lubrication is duplex with a pump forcing in oil in excess of the requirements



OVERHEAD CAMSHAFT OF THE MERCEDES AND THE TRIANGULER INTAKE FROM THE PACKARD CARBURETER



THE MOTOR OF THE LITTLE CORNELIAN, THE SMALLEST CAR IN THE RACE



CYLINDER BLOCK OF THE MOTOR BURMAN MADE FOR HIS PEUGEOT

of the motor and a second pump to remove the surplus and return it to a tank where it can cool. Incidentally, this is becoming a regular racing practice, as the importance of a steady supply of cool oil has come to be realized.

Smallest Car on the Track

A particularly interesting small car, because it is so small, is the Cornelian. This grasshopper amongst the elephants has a Sterling motor of a paltry 116-cubic-inch displacement and yet can lap at over 80 miles an hour, owing to the negligible weight and windage of the tiny machine.

It has no frame at all, as the sheet-steel body acts as a frame as well; still more extraordinary, it has no axles. This sounds like an impossibility, but it can be explained by the spring system, which replaces the axle proper. At the rear there are three springs placed transversely one above and two below and the extremities of these springs are linked to brackets which carry the rear road wheels. The transmission is fixed to the frame-body.

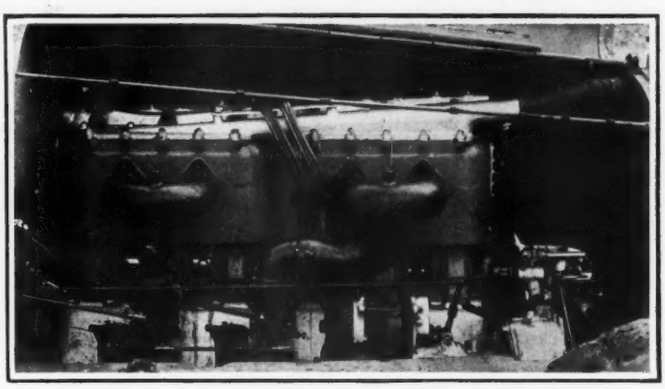
There has been but one radical change made in the Mercedes for the 500-mile race, a Packard carbureter of standard type having been substituted for the original Mercedes. It is understood that this change has cut some two or three seconds off the possible lap time on the speedway and onlookers can observe that there is no misfiring or popping when the throttle is shut off for the turns, as is common with many racing carbureters. Despite the presence of an air valve, which is supposed generally to be bad for high-speed work, the Packard carbureter certainly works wonderfully well and if it does as well in the race as it has in practice, the details will be worthy of the closest study.

The car now has a new body with a square section tail, this having been built in Detroit to surround the gasoline tank behind the seats. A particularly striking feature is the absolute steadiness of the front wheels when the car is traveling over 100 miles an hour on the straightaways, this being due to a caster wheel system worked out by Mercedes for the French road-racing classic.

First of the Peugeots is Resta's car, which was the spare mount of the Peugeot team at Lyons last year. It is identical with the car that Boillot drove nearly to victory, as he was put out near the finish only by a mischance which robbed him of second place. Practically it is as fast as the Mercedes. Cast-iron cylinders, with four valves per cylinder and two overhead camshafts, driven by a train of spur gears at the front end, specify the motor, and the crankshaft bearings are ball. Lubrication is by drip feed through a row of sight feeds, which lead to the bearings and sundry other parts, the circulation being maintained by pump and supplementary hand supply.

Peugeot Exterior Changed

The body work has been altered a little. In the French race, two spare wheels were carried standing lengthwise of the car and upright inside the tail, which had a humped camel back to accommodate them. This hump has been cut off, as there is no need to carry wheels on the track. The tail now is smooth and ordinary.



THE SIX-CYLINDER SUNBEAM MOTOR, SHOWING THE TWO CARBURETERS, EACH FEEDING A BLOCK OF THREE CYLINDERS

Next in the Peugeot list comes Bob Burman's special car, which is a Peugeot with

DETAILS OF THE CARS ENTERED IN THE FIFTH ANNUAL INTERNATIONAL SWEEPSTAKES, MAY 29, AT

No.	CAR	DRIVER	NO. CYL'S	BORE&STROKE	PISTON DISP.	CAST	VALVES					MAG-NETO	CARBURETER
							Diameter	Number	Lift	Location	Operation		
1	Stutz	Wilcox	4	3.816x6.484	298.6	Block		16		Head	1 Camshaft	Bosch	Stromberg
2	Mercedes	R. De Palma	4	3.690x6.300	270.1	Singly	1 7/8	16	7/16	Head		Bosch	Packard
3	Peugeot	Resta	4	3.620x6.650	273.8	Block		16		Head		Bosch	Zenith
4	Stutz	Cooper	4	3.808x6.484	295.4	Block		16		Head	1 Camshaft	Bosch	Stromberg
5	Sunbeam	Porporato	4	3.690x6.300	270.1	Block	2	16	1/4	Head		Bosch	Claudel
6	Stutz	Anderson	4	3.808x6.484	295.4	Block		16		Head	1 Camshaft	Bosch	Stromberg
7	Sunbeam	Oldfield	4	3.690x6.300	270.1	Block	2	16	1/4	Head		Bosch	Claudel
8	Peugeot	Burman	4	3.620x7.100	292.3	Block	2	16	7/16	Head		Bosch	Rayfield
9	Kleinart	Klein	4	3.980x6.000	298.6	Block	2 1/4	8	3/8	Horizontal		Bosch	Schebler
10	Duesenberg	Alley	4	3.980x6.000	298.6	Block	2 1/4	8	3/8	Horizontal		Bosch	Master
11	Peugeot	Lecain	4	3.030x6.060	124.8	Block	2	16	7/16	Head	2 Camshafts	Bosch	Claudel
12	Sunbeam	Grant	6	3.150x5.900	274.9	Threes	2	12	3/8	Side	1 Camshaft	Bosch	Master
14	Duesenberg	O'Donnell	4	3.980x6.000	298.6	Block	2 1/4	8	3/8	Horizontal		Bosch	Schebler
15	Lelage	J. De Palma	4	3.656x7.109	298.4	Block	2 3/16	16		Horizontal	Rockers	Bosch	Claudel
16	Sebring	Cooper	4	3.985x6.000	299.3	Block	2 1/4	8	3/8	Horizontal	Rockers	Bosch	Schebler
17	Maxwell	Carlson	4	3.750x6.750	298.0	Block	2 1/4	16	7/16	Head	1 Camshaft	Bosch	Master
18	Maxwell	Orr	4	3.750x6.750	298.0	Block	2 1/4	16	7/16	Head	1 Camshaft	Bosch	Master
19	Maxwell	Rickenbacher	4	3.750x6.750	298.0	Block	2 1/4	16	7/16	Head	1 Camshaft	Bosch	Master
20	Mais Special	Mais	4	4.373x4.985	299.0	Block		8		Head		Bosch	Rayfield
21	Bugatti		4	3.900x5.950	300.0	Block		12				Bosch	Master
22	Purcell	Cox	4	4.370x4.970	298.2	Pairs	2	8	7/16	Side			Schebler
23	Cornelian	Chevrolet	4	2.932x4.250	114.6	Block	1 1/4	8	9/32	Head	Rockers	Bosch	

new cylinders, new pistons and new connecting rods. The valve gear is the same as that on Resta's car and the general design is similar, but Burman has cut off 44 ounces of weight from the pistons and a good deal more from the connecting rods.

The new pistons are Alloyanum and have but a single ring apiece, this being very wide, with a deep half-round groove cut in the face. This groove catches oil and cares for cylinder lubrication, which Burman says was inefficient when first he had the car. The pistons have small holes drilled in them that lead to the wrist-pin, which bears in the casting direct, and there is a new oil lead which takes lubricant to the cylinder walls. This lead has three branches and each branch terminates in a double head between a pair of cylinders, so that two are fed from each pipe, while there are separate leads to care for the ends of the motor block. Oil is fed under a pressure of 8 pounds per square inch.

Peugeots and Sunbeams

The connecting rod is a hollow form, made from hand forging, very light and strong, and, it may be added, very expensive. It is a beautiful piece of workmanship, however.

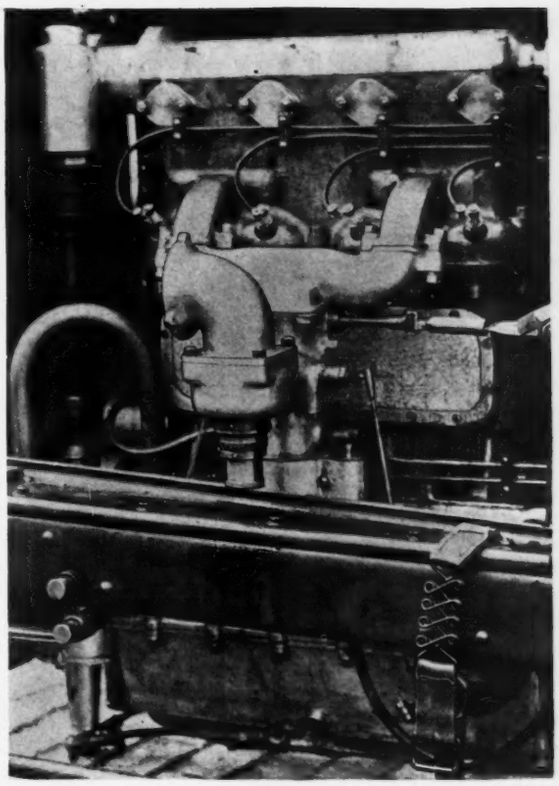
The remaining Peugeots are far below the capacity limit and are not expected to show any very wonderful speeds, for though a 3-liter Peugeot last year was the surprise of the 500-mile race, it had not so powerful a field to contend with. In general design, the smaller Peugeots are much the same as the larger cars, in fact the latter were developed after the success of the 3-liter Peugeots in continental racing had satisfied the Peugeot engineers that the principles of design were right.

It was an open secret last year that the grand prix Sunbeams, to be tooled by Porporato and Oldfield Saturday, were close copies of the 1913 Peugeots, and though there are small detail differences in the motor and many changes in the chassis, the statement is true in a broad sense. The motors are almost exactly alike in appearance and there is simply a small alteration in the valve operating system. There are two camshafts like the Peugeot, driven in the same way, but instead of using short, straight push rods, which approximate to a direct action on the valve, the Sunbeams have short rockers. These rockers are not used to bridge a gap between cam and valve, but are simply hinged levers or "fingers." The cam is directly in line with the valve-stem head and the finger is there for the cam to wipe against.

Ball bearings are used and oil is fed by sight feeds and pump in the Peugeot way. The pistons are steel, with a leg which is welded to the center of the head and has its lower extremity resting upon the center of the wrist-pin, so as to give support and help carry away heat from the head.

The other two Sunbeams, the mounts of Grant and Limberg, already are well known in this country and have been altered only in small details. They remain essentially the same as they were originally and have the distinction of being the only six-cylinder jobs in the race.

The Delage, in which John de Palma makes his big league debut, is the car which ran into second place at the Le Mans meet in France in 1913, and has valves arranged in two rows on either side of the cylinders, with stems horizontal and operation by push rods and rockers from camshafts located in the crankcase. John de Palma has fitted new cylinders so as to alter the size of the motor, but the car is unchanged otherwise and all the original valve mechanism is in use today. This is not the last-year Delage which created such a sensation by having valves operated mechanically in both opening and closing directions, but that which preceded it by 12 months. John de Palma's Delage is the car with which Thomas won the 500-mile race at the speedway last year so that it is not unused to the brick oval. Whether the cutting down of the motor's displacement has lessened the speed of last year's winner, is yet to be determined. The young driver's accident of last week prevented further trials.



MAXWELL MOTOR, SHOWING THE VERTICAL DRIVE TO THE OVERHEAD CAMSHAFT

INDIANAPOLIS — INCLUDING DRIVERS, MOTOR FEATURES AND THE EQUIPMENT THAT PROBABLY WILL BE USED

WHEEL BASE	GEAR RATIO	TIRES		WHEELS	SHOCK ABSORBERS	SPARK PLUGS	LUBRICATION	OTHER EQUIPMENT	CAR	No.
		Make	Size							
104	.....	Silvertown	33x5	Houk	Hartford	.....	Force	Motometer	Stutz	1
112	3.1-1	Goodrich	33x5	.....	.....	.....	.....	.....	Mercedes	2
106	2.5-1	Goodrich	34x4½	R.-W	Hartford	.....	.....	Motometer	Peugeot	3
104	.....	Silvertown	33x5	Houk	Hartford	.....	Force	Motometer	Stutz	4
112	2.9-1	Goodrich	33x5	.....	.....	.....	.....	.....	Sunbeam	5
104	.....	Silvertown	33x5	Houk	Hartford	.....	Force	Motometer	Stutz	6
112	2.9-1	Goodrich	33x5	.....	.....	.....	.....	.....	Sunbeam	7
106	2.5-1	Goodrich	34x4½	R.-W	Hartford	.....	.....	Motometer	Peugeot	8
109	2.5-1	Michelin	33x4½	.....	.....	.....	.....	.....	Kleinart	9
106	2.6-1	Nassau	33x5	.....	.....	.....	.....	.....	Duesenberg	10
103	3.0-1	Goodrich	33x4½	R.-W	Hartford	.....	Force	Motometer	Peugeot	11
110	2.8-1	Silvertown	34x4½	R.-W	Hartford	.....	Force	.....	Sunbeam	12
106	2.6-1	Nassau	33x5	.....	.....	.....	.....	.....	Duesenberg	14
110	2.5-1	Nassau	34x5	R.-W	Hartford	Bosch	Splash	Motometer	Delage	15
102	2.6-1	Nassau	33x5	R.-W	Hartford	Bosch	Force	Motometer	Sebring	16
110	2.6-1	.....	33x5	Houk	Hartford	Rajah	.....	Motometer	Maxwell	17
110	2.6-1	.....	33x5	Houk	Hartford	Rajah	.....	Motometer	Maxwell	18
110	2.6-1	.....	33x5	.....	.....	.....	.....	.....	Maxwell	19
108	.....	Michelin	33x4½	Wire	Hartford	Bosch	Splash	Motometer	Mais Special	20
111	.....	Firestone	32x4½	.....	.....	.....	.....	.....	Bugatti	21
113	2.4-1	Silvertown	34x4½	.....	.....	.....	.....	.....	Purcell	22
100	.....	Nassau	30x3½	R.-W	.....	Bosch	Splash	Motometer	Cornelian	23

Motor Racing 20 Years Ago

by Charles E. Duryea

AMERICA'S first motor car race was held in the early winter of 1895. It was run over roads heavy with snow and slush, not upon a speedway of brick with banked turns. The prize money was not large, the purse totaling $5,000 one one-tenth of the sum for which the drivers will battle at Indianapolis 2 days hence. The speed attained by the winner was ridiculously slow, newspaper reporters, covering the event on bicycles, having to wait until the cars caught up to them. A record of 82.47 miles an hour, established by Rene Thomas in the 500-mile race of last year, was not even dreamed of at that time. Yet the first contest ever run on this side of the Atlantic was far more epochal in results than the spectacular classic of Saturday will be.

A score of years have gone by since the motor contest bee began buzzing in the busy brain of H. H. Kohlsaat, then proprietor of the Chicago Times-Herald. Just how much he was indebted to the aid of his able lieutenant, J. F. Adams, is not known, but certain it is that, with one exception, Mr. Kohlsaat stands out as the only patron of the now great industry in the first 10 years of its existence. In this land of many multi-millionaires, only two came to the front in the first decade of the industry and contributed their money freely to encourage development, with no hope of reward except the good they could do. The second was J. B. Walker, of the Cosmopolitan.

KOHLSAAT AND ADAMS WERE CONTINUALLY ANNOUNCING THE RECEIPT OF ANOTHER ENTRY WITH A DESCRIPTION OF THE WONDERFUL YET-TO-BE-BUILT CAR AND WHAT IT WAS EXPECTED TO DO

For 3 years before, there had been rumors of a crazy man's carriage running without horses about the streets of Springfield, Mass., particularly on the vacant lots, back streets and less used roads, where it would scare as few as possible and attract the least attention. Similar rumors of a horseless buggy had come from Kokomo, Ind., in the preceding year. And there had been, from time to time, various rumors of attempts at building such devices.

Across the water, actual races had been held. Contests gotten up by Le Petit Journal, of Paris, had brought out a number of vehicles, which attracted much interest and gave promise of a future more than that of a toy or passing fad. They had good roads over there and horse flesh was high, also horse feed scarce. In this broad land, horses and horse feed were so cheap and roads so bad that no one believed in horseless vehicles except a few partially demented individuals who were foolish enough to spend money they should have saved for a rainy day, on such an impossible, or, at least, impractical and unprofitable device. All the more credit then to Kohlsaat and Walker.

Cars Shown at World's Fair

While there had been occasional exhibitions of single vehicles, generally of the steam variety, and while the managers of the Columbian Exposition at Chicago had secured two actual exhibits and one or more other entries in 1893; this contest of the Times-Herald was the first motor car event in America. It was announced in the early summer of 1895 to be held the first week in November and prizes amounting to $5,000 in cash and a gold medal were to be awarded. These prizes were particularly attractive to the men who were willing to work on this problem at that time and the amount of work they called forth was all out of proportion to the expenditure.

It seems to have been the idea of the contest promoter that 3 or 4 months was ample time for American mechanics to create, from nothing, full solutions of a problem that had been in mind longer than any other mechanical problem, except possibly flying, and that already had had more effort and money spent on it, without a solution, than any other problem. This idea was shared by a small number of progressives who had seen the trolley car very largely crowd out the horse in the preceding 10 years and who were sure that the magic power, electricity, would solve the problem of traveling on the common roads without horses. Their idea seems to have been that all that was needed to make a successful and beautiful horseless carriage was a few dry cells in one's pockets, a steering lever, instead of horse shafts, and a push button on the seat side. So between those who refused to believe and those who knew so much that was not so, the early workers had a hard time.

This first contest was advertised only in the Times-Herald and so notice of it failed to reach many men who would have tried for a prize and did not reach many who did try till very late in the season. Aside from a few mechanical and technical magazines, which gave it a short mention, the contest was not well advertised outside of Chicago and vicinity. However, Kohlsaat and his faithful Adams kept it constantly in the Times-Herald. When they were not telling of the brilliant future in which every man who cared to should own his individual transportation, they were announcing, in columns on the front page, the receipt of another entrant with a description of his wonderful yet-to-be-built car and what he ex-

pected to do with it. And in the meantime, they started a word-making contest and offered a prize for the best name for the coming carriage. Judges to decide the matter, and rules to govern the word manufacturing contest, also were provided. Think of it! Prizes for a new word in a language that already had 50 per cent more words than any other, and this, regardless of the fact that languages grow and are not created. We may help or direct the growth, but creation is next to impossible. However it helped to fill the paper and keep the subject before the people. How much valuable space was spent on this contest is not known, but the few thousands spent in prizes was but a small part.

At that time the bicycle was in the ascending period of its history and the influence of its rapid growth and peculiarities of construction affected both builders of vehicles and judges of contests. "Motorcycle" was the name chosen for the new vehicle, totally ignoring the fact that motorcycles had been proposed and built and doubtless would become prominent. This name, selected in July, 1895, gained considerable usage during that summer and fall, but today has become extinct as applicable to motor cars. It was not new, nor did it express the facts as to the vehicle that was appearing above the horizon.

Decide on Chicago-Milwaukee Run

The course, as decided upon in July, 1895, was to be from Milwaukee to Chicago, and the prizes as follows: 1, $2,000 and a gold medal; 2, $1,500; 3, $1,000; 4, $500. The contest was open to the world, except that in the event the first prize went to a foreign car the second should go to an American production. The rules were fairly elaborate. Entrants had to pass a trial or eliminating test on October 26, except such as had won, at least, honorable mention in the French race of that or the preceding year. Three wheels or more and at least two people aboard were required. Muscular power was not permitted except for controling.

The points on which the contest was to be judged included practicability, speed, cost, economy and appearance; certainly a very sensible array, and one intended to prevent some skeleton affair, mostly a motor on wheels, from winning the prizes. Entries kept coming in all summer until eighty-three apparently bona fide ones had been received. It was not to be expected that all these would start. The French race of 1895 had sixty-six entries and sixteen starters, and this in a land of good roads and in midsummer, with good weather. The first French race in 1894, distance 30 miles, had 102 entries and only twenty-one starters. Of the eighty-three entries, when the real starting time arrived, eleven took starting cards and five or six started in spite of the practically impassable road conditions.

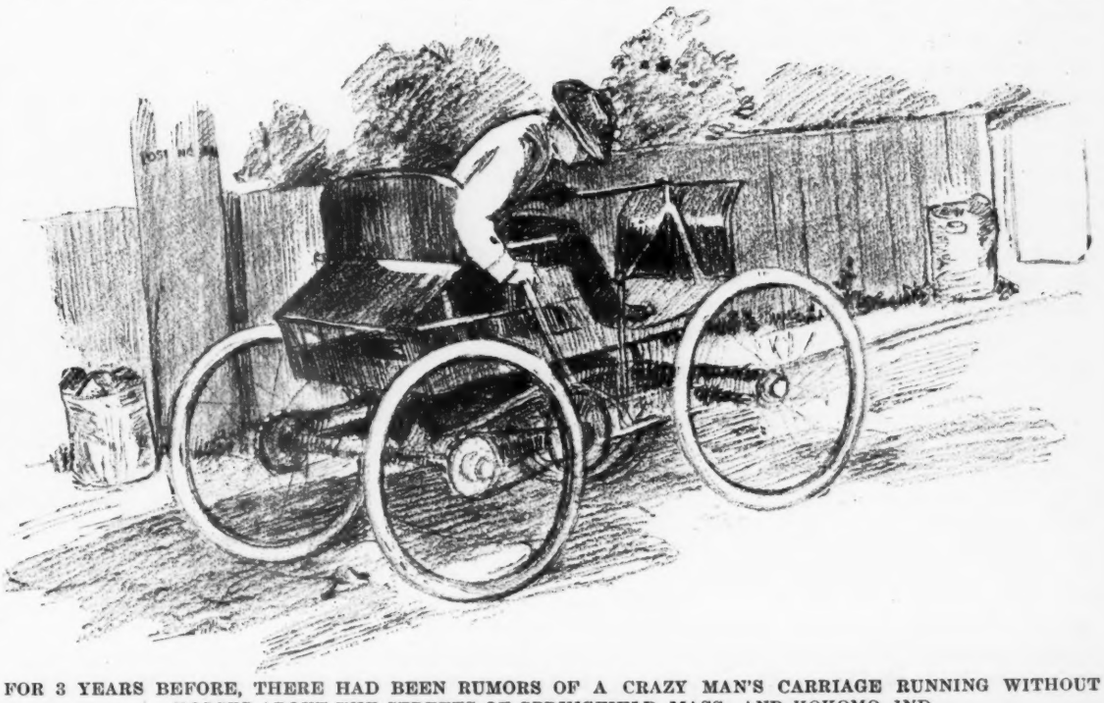
The last of October arrived with perfect weather. Washington park had been secured. Testing apparatus for taking horsepower, testing draw-bar pull, fuel consumption, etc., had been set up and put in charge of capable men, so far as this could be done when men versed in the peculiarities of the motor car naturally could not be had, but only a handful of vehicles showed up and even fewer, proportionately, of spectators. Most of those who were there were men with bees in their bonnets rather than the great public that should have been seeking the new carriage.

Many a man who has since been a factor in the trade got his first practical lesson at that contest. Telegrams flowed back and forth between the entrants and the management. "Give us a few more days; a week, a month" was the plea in those telegrams. There was nothing else to do. Reluctantly and against the protests of those who had spent their hard-earned money to get there, the contest was postponed 1 month. But with every spirit of fairness, Kohlsaat put up a purse of $500 as a consolation prize to be equally divided among those contestants who should run to Waukegan and back, no times or conditions, distance about 50 miles.

The starting point was lined with several thousand spectators who had no idea of buying and no care as to construction, but who wished to see them go. Here was the first chance the Duryea company had found to distribute circulars. It had a dozen machines well under way and was looking for orders. Hundreds of circulars were given out, but if any business followed we never knew of it. This is believed to be the first real solicitation for business made by an American manufacturer of motor cars.

A Field of Three Starters

Three vehicles started, the Duryea, a Benz car owned by Mueller, and a Kane-Pennington. The latter made no real effort. The Duryea was lighter and faster and quickly drew away from the Benz, but when near the outskirts of the city, its bicycle chain of extra width parted. The delay of fixing this permitted the Benz to pass, but soon the Duryea was in pursuit. The roads were of dirt, but dry and really good. It promised to be a pleasure jaunt with $250 at the end. Just then there loomed ahead a German farmer driving a single horse attached to a light cart. The traveled track was on the right of the main way and the farmer was in it. There was ample room at the left to pass him. The same prudence that dictates the modern motor laws caused us to sound a bell that the farmer might know we were coming. He looked around and, recognizing us as one of the racers, turned to his horse. We went on, prepared to pass him on the left, but he, in the goodness of his heart, had planned otherwise. He had grasped the lines firmly and brought the horse over to the left that he might give us the traveled part of the road. He had not imagined that before he could get out of his tracks we would be past him. With the cart still in the track at the right and his horse on the left, there was no choice other than to hit him or take the ditch.



FOR 3 YEARS BEFORE, THERE HAD BEEN RUMORS OF A CRAZY MAN'S CARRIAGE RUNNING WITHOUT HORSES ABOUT THE STREETS OF SPRINGFIELD, MASS., AND KOKOMO, IND.

WITH THE CART STILL IN THE TRACK AT THE RIGHT AND HIS HORSE ON THE LEFT, THERE WAS NO CHOICE OTHER THAN TO HIT HIM OR TAKE TO THE DITCH. WE TOOK IT AND LEFT THE MUCH-NEEDED $250

We took it and left our front wheels and that much-needed $250 on the other side.

A tow to the freight station and shipment back to Springfield ended the consolation run for us, and that well-meaning German never understood why he had not done us a favor as intended. In the meantime, the Benz owners, believing that the faster Duryea would overtake them any minute, were hustling their best. Ice was carried on board and fed into the water-tank as they went along to keep the temperature down. Late in the evening they got back and received the entire $500.

Blizzard Procedes First Race

A month later there was a second gathering at Chicago. This time the contest was to be pulled off regardless of weather or people, but remembering the Washington park fiasco, headquarters were at Sixteenth street and Wabash avenue in a one-story salesroom, formerly occupied by the Studebaker company. Here a dozen or more vehicles found shelter and the testing stand was housed. And shelter was needed. Two days before, a severe blizzard had swept over the country, burying everything 2 to 3 feet deep. Wires were down and trains were held up. Then a warm wind melted the top and allowed it to freeze, making a crust that on Thanksgiving day morning would carry pedestrians and sleighs. It is doubtful if any subsequent single day contest has been run under such adverse conditions. Some of the contestants arrived at Jackson park on horse-drawn trucks. Others were towed there. The Duryea used its own power. The Mueller Benz arrived very late. To the Duryea, although it bore No. 5, was given the honor of the start. All the others had to be helped almost immediately. Morris, with his electric, created a laugh by calling out, "It is against the rules to accept outside help, but (sotto voice) I guess you had better push us."

Morris managed to get downtown. Sturges, with enough electricity for 60 miles, managed to get into Lincoln Park—about 12 miles—which is some indication of the severity of the street conditions through the city of Chicago at that time. The course, as finally amended, went up the lake shore and back into the city; out Milwaukee avenue and back again, through the parks on the west side and back to Jackson park.

Teams, both two and four-horse, with only light sleighs to draw, tried to follow, but could not, so they cut across from point to point near the city outskirts and thus kept in close touch with the cars when they were in the city. The Duryea broke a steering arm, probably strained by the accident of a month before, and as it was a holiday, had difficulty in finding a blacksmith to weld it. A sparker also gave trouble, but aside from this and losing the way for a couple of miles, the car went ahead steadily. The sun came out and the crust softened so that traveling in the later part of the day became easy. The Benz, several hours behind, had it much easier.

Benz Driver Faints

The Roger, a French model Benz, had a harder fight. Dark caught it on the west side with a packing blown out and its driver and observer, worn out, abandoned it, but completed the course next day. The Benz operator fainted some miles from the finish and the observer brought the rig to the finish line about 11 p. m., where it was abandoned for the night. The Duryea had arrived early. The writer offered to take the lever and pilot it back to its garage, 7 miles down into the city, but Frank Duryea, its driver, claimed to be as fresh as ever.

The Duryea not only won the contest against all America, but against two of

presumably the best foreign rigs. It was the only vehicle to leave and get back to its quarters the same day, also covering 2 miles in addition to the course; total, about 70 miles of the very worst roads.

Making the best of the situation, the judges splendidly scattered the prizes to help out those who could ill afford to attend such a contest and get nothing. They awarded the first prize of $2,000 to Duryea; second prize of $1,500, to the Benz; third prize of $500, to the Roger; fourth prize of $500, to Sturges. The gold medal was given to Morris and Salom, $200 to Lewis, $150 to Haynes and Apperson; $100 to Hertel, and $50 to De la Vergne.

While such reports as the papers gave out generally were unfavorable and caused many country papers and horse owners to sneer at the new wagon because of the poor showing made, critics simply showed their ignorance of the actual conditions. That contest proved the motor car superior to the horse. It settled once and forever the question, unanswered until that time: "What will they do in the winter?"

Contest Marks an Epoch

Those enthusiasts who had faith went home and begun work—work that did not bear fruit for several years, but 5 years later was making itself felt. No contest in the United States has seemingly accomplished so little and actually done so much. It was the first. It showed even then that America's mechanics were not behind. It started the now enormous industry that leads the world. But because of the bad roads and poor showing, because the public still did not believe in power vehicles, because of the lack of encouragement and the market, the new industry promised to lag.

Seeing this, another altruist, John Brisben Walker, proprietor of the Cosmopolitan magazine, jumped into the breach and announced another contest to be held on Memorial day from the New York city hall to Irvington-on-the-Hudson and return, offering $3,000 in prizes. Through Chicago in deep snow was permissible, but the whole length of Manhattan island on a holiday was but one of the absurdities of that worst-managed of all American contests.

Walker believed that while 4 months was not sufficient to get out practical motor cars, 6 months additional would be, and that with real roads and a certainty of good weather, he would get a large entry list. Again the advertising was at fault. The entrants who tried for Kohlsaat's prizes had begun to find the difficulties of motor car building. The public, having been supported in its preconceived notion that the horseless carriage never could be, had lost interest. A monthly magazine could not keep interest at a fever heat, as Kohlsaat and Adams had done in the columns of the daily. Doubtless the management was as faulty in getting entries as it was in caring for them after they were obtained. Some thirty odd entries were received, but only seven or eight started. Four of these were Duryeas, two were foreign and one was an Ohio-owned car belonging to a Doctor Booth.

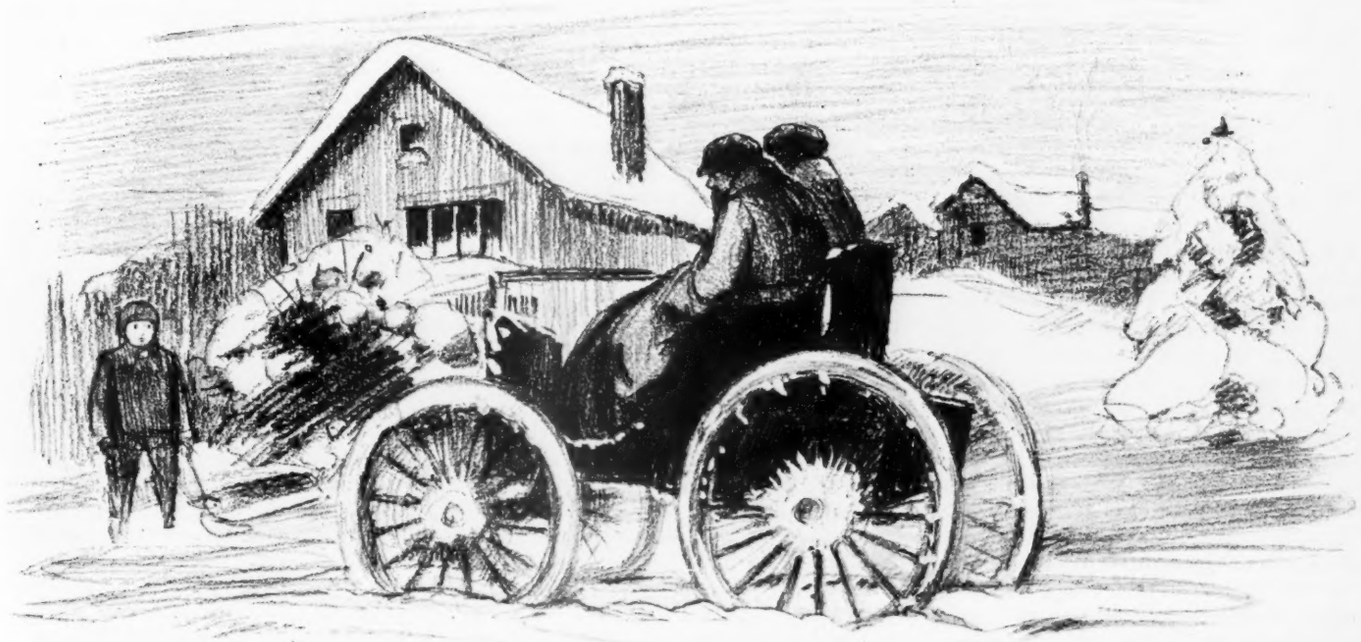
I had personally requested Walker to place signboards at the turns that we might be sure of the course, but none were there. Instead, a platoon of cyclers were to lead us, but the cyclers, like the old German farmer, did not know our speed even in those days and as leaders they were left hopelessly behind before the trees of Central park came in sight. Left to ourselves, we followed the course as best we could, turning aside to dodge parades and find streets more clear.

Five Duryeas were brought to the city and unloaded on May 29. Two of these, carrying the four drivers, were driven over the course that the drivers might learn it. One got lost, had trouble, and we had to go back for it, getting in at midnight and to bed at 1 o'clock. I had just fallen asleep when I was awakened by a solicitous stockholder, with a copy of the Selden patent. It was my first introduction to that afterward famous document, and clad in the flowing robes formed by a sheet, I read and gave my first opinion on it, afterward supported by the court.

Crowd at Starting Line

Only four of our cars were entered, but the Chicago winner had been brought along for an emergency and to add to the exhibition. The start was to be from Mail street, at 9 a. m., and the usual crowd that gathers in New York to watch a dog fight or a safe being hoisted, was there. Of course, there were a few enthusiasts beside, mostly those who had aspirations in the manufacturing line. One or two of the Duryeas had been sold and were to be delivered after the race, so their owners-to-be were there in the morning and later at some selected hill top to watch us pass. We had not stopped for breakfast and in our anxiety to be ready had reached the start about 8 o'clock. Nine, 10, 11 and 12 o'clock passed with no starter and no signs of a race. Rumors of various kinds reached us, but no one seemed to know anything or be in charge. We took a chance and rushed for a sandwich, but, in the general disgust, even this tasted bad.

Finally, some time after noon, we were off. A starter had appeared. Up Broadway we went, an insignificant few, led by a few cyclists, and seen by very few. Those few that had learned of our coming



THE TIMES-HERALD RACE SETTLED ONCE AND FOREVER THE QUESTION UNANSWERED UNTIL THAT TIME—WHAT WILL THEY DO IN WINTER?

and expected us, had grown tired of waiting. Away from Broadway the town was largely deserted, and we were soon compelled to leave Broadway to avoid a parade with its thousands of spectators. The cyclists we saw no more. We tried to keep together, but when the best foreigner, a Benz with a high gear, or rather belt, undertook to run away from us, it became a scramble. The experiences of 1892 and thereafter had taught us the need of power. We had it, not yet enough, but more than the others. On the first hill we went by the Benz and chaffed the driver by offering a tow, if he would produce a rope.

Near the end of the island a cyclist, mounting while watching a ball game, and on the wrong side of the street, fell in front of a Duryea and his wheel was wrecked. A policeman, also watching the ball game, was handy and took the driver of the new vehicle to jail. The rest of us had no time to stop and settle or give bail. The driver had to spend a night in jail, which nearly broke his heart.

No Judge on the Job

At Kingsbridge, we were to re-form and the real race was to begin, but no one met us; no judges appeared. Finally, after a long wait with more disgust and hunger, somebody told us the judges were delayed and would meet us at Irvington. So the race began. As we went over the top of the third hill we saw the foreigner coming over the top of the second. We had to depend on the groups of spectators at the turns for direction. At one place they very kindly directed us over a mountain instead of the usual road around it. It was too late to turn back after we found what we were up against, but over it we went.

We climbed the hills as fast as we could, but we coasted faster than we had ever traveled before. These roads were not so good as they are today, but they were years ahead of the Massachusetts and Illinois roads, over which our experience had been gained. We had no windshields, or goggles, consequently, on those hills, we shed tears which, instead of running down our cheeks, went back over our ears.

When near our destination we were turned suddenly into a lane leading to a clubhouse near the river. The road was being repaired and was a jumble of boulders, loose, broken stone and such impediments with which roadmakers of those days were wont to impair the road. I realized that we could not get back up that hill over such going, but Frank was ahead and I would not leave him alone. This boulder canyon terminated at the clubhouse door where Walker had assembled some guests to receive us and see the wonderful new vehicles, but the wonders inside the house were evidently of more interest than those outside, so our reception was not noticeable. Not being club members, we could get nothing to eat. Like beggars, we finally did get a few scraps at the kitchen door.

Naturally not well pleased, we were far from inclined to be pleasant toward the other fellow, and when a fine-appearing man finally came near enough to ask some questions, he was not enthusiastically received. He then explained that he was General N. A. Miles, one of the judges, and was given all the information he asked. If there were other judges, they were conspicuous by their absence.

Walker then asked us to evolute on the lawn for the benefit of his guests. The lawn recently had been plowed and sowed in rye and grass seed. It was beginning to get green with the young sprouts breaking through and was practically a plowed field into which our wheels sank a couple of inches. Naturally the visitors got a perfectly correct idea of the capabilities of the new vehicles as they slowly crawled about that so-called lawn on low gear, making a tremendous noise and creating considerable odor.

Then, as a finale, we were given the order to start on the return race to Kingsbridge, and advised that we could probably drive across the hillside between the house and the road. The Benz had arrived and when we last saw it the driver was apparently trying to start it. Wise man; he waited till the guests were gone. We set the low, jumped out and, by walking by the side and pushing, were able to slowly zigzag our way across and up that rocky mountain side. The ever alert newspaperman stabbed us in the back with his camera and again the public got a false idea of the capabilities of the new vehicle.

Nevertheless, we got up. Never before had our engine been so tested. The steam formed so fast it could not escape from the water tanks rapidly enough through the usual overflow, so it burst the tank and spilled the hot water on our belts, but we relaced them and went ahead. At a hilltop where the sun was bright, but the air cool, we found Doctor Booth lying in the grass near his machine. We graciously inquired as to his trouble. "Poor gasoline," he said. The course was simply too hard for his car, even with his help.

We reached Kingsbridge again, but there was no one there to meet us or take our time. Neither were there judges. After waiting until it got so late there was a certainty no one would come, we went on to the city hall. The three Duryeas were the only cars to get back to the city that day. Naturally, we got all the prizes, $3,000. We hope Walker, at least, got some amusement, for his well-meant attempt did the industry very little good.

About this time, the State Fair Association, of Providence, R. I., decided it would pay to offer prizes for a motor race at its fair, but it feared it could not get enough cars together to make it a success. The Duryea company pledged itself to interest not only a car of its own, but enough of its customers' cars to make a showing that would be good, so we went ahead and advertised largely in the locality a race to come off in September, 1896, with about $2,000 in prizes. A. L. Riker and the Morris and Salom crowd entered one electric each. They naturally wanted short sprints. We insisted that one race be of some distance. We were building vehicles, not sprinting machines.

Evidently the electrics won, for the race was announced as a 5-mile race in five heats, one heat being each day of the fair. Besides our own entry, a Duryea was entered by one of our customers, William Ashley & Son, of Springfield.

When the time arrived, the track was far from being in good condition for power vehicles. The time for the 5 miles was: Riker, 15:1; Morris, 15:14; Duryea, 18:47, and Ashley, 20:59. The Duryea had a flat tire which materially reduced its speed. The time on the second day was: Riker, 13:06; Duryea, 13:13; Morris, 14:33, and Ashley, 16:31. The next 2 days were skipped because of a heavy storm, which make a fair impossible, but which gave the electrics time to secure some more batteries, which they piled on top of their already full, four-passenger vehicles. The tire ordered for the Duryea failed to arrive in time for the race on the fifth day, so we had to patch up the one we had and hope it would hold. Tires in those days cost money and as money was not plentiful, extra tires were scarce. Even the rubber company carried none in stock and had to make them to order.

Flat Tire Stops Duryea

The marked superiority of the electrics in the matter of speed as shown by the first two trials caused many to pronounce it an electric contest, with the gasoline cars not in it, but we believed we had the fastest vehicle and only hoped for a good track and good tires to prove it. The storm had packed the track so that it really was faster than before, although somewhat guttered. The start was from practically a standstill, since the vehicles came up to the line at 3 or 4 miles per hour.

At the first quarter the Riker led Morris by four rods, while the Duryea followed him by a like distance. In this distance, they had gotten up to speed and the differences between them represented the greater starting ability of the electrics. The Duryea rapidly gained and caught Morris at the five-eighths, although Morris was gaining on Riker. Then suddenly the Duryea was seen to slacken perceptibly and gradually lose position. Examination after the race showed the single-tube tire flat again.

This contest developed some surprises, one of which was that the gasoline cars were less noisy at speed than the electrics. The latter went by the grandstand with a roar from their gears, but the gas cars slid by like ghosts. Fifty-three thousand persons were in attendance, breaking all records.

Undoubtedly, this contest largely was responsible for the favor with which the New England states have accepted the motor car in recent years.

The 500-Mile Race in Retrospect

LET your sub-conscious mind carry you 2 days hence. Give it carte blanche to transport you into the future, using your conscious mind to direct the journey Indianapolisward. You are now in the stands, or safely ensconsed on the cushions of your motor car, opposite the crowded paddock boxes; your eyes eagerly watching the highest attainments in speed creations, from both sides of the Atlantic, lined up for the start of the fifth international sweepstakes; your ears alert for the shot that will start them off on the gruelling grind of 500 miles in which man masters mechanisms of steel, hurtling around the 2½ miles of red brick, known as the Indianapolis motor speedway.

Score, 2-2. This, the rubber, will determine whether supremacy in motor car speed and endurance and drivers' skill, lies in America or Europe. From the opening gun, American drivers will make a mighty exertion to regain the laurels lost to French cars and drivers in 1913 and 1914. Will they be successful? If so, to whom will the honors go?

The unexpected often happens and some comparatively unknown contender may be heralded as the speed king on the evening of May 29, his name may find a niche in the hall of fame, and go down in the annals of motor race history, as the maker of some new record. Yet we are prone to judge by past performances, in a certain degree. So let us glance in retrospect for a moment, study the previous events, the drivers and their records.

1911

SPECTATORS at the first speedway event, held in 1911, found thrills a-plenty. So closely contested was the race that five had a chance to be proclaimed victor even to the last lap. Ray Harroun, driving the Marmon six-cylinder Wasp 74.59 miles per hour flashed under the wire 1 minute and 43 seconds ahead of Ralph Mulford, who piloted a Lozier. Winning by such a narrow margin was considered little short of remarkable, the 500-mile distance considered.

David Bruce-Brown, winner of the American grand prize road race at Savannah in 1910, thundered across the tape in his Fiat 8 minutes and 38 seconds behind Mulford. Only 10 minutes and 21 seconds between the winner and third! Wishart, in a Mercedes, followed closely behind Bruce-Brown, and first reports gave de Palma and his Simplex fifth place. This later was given to Joe Dawson, a revision of the sheets lasting over 24 hours showing that, instead of having lost in the last lap while running fourth, Dawson really had completed the race in the lap previous to the one in which his engine failed. Dawson's Marmon bumped another car earlier in the race, poking a big hole in the radiator. He stopped for oil but did not put any water in because he figured the leaky radiator would not hold it. He hoped on oil to make what he thought was his last lap, but the experiment failed. Joe thought this a repetition of his experience in the Atlanta race the year before, when a substantial piece of the prize money awaited him in the Coca Cola race if he could go only one more lap. It was not until the day following the 500-mile event that he was announced as fifth in rank.

Some accidents marked the first speedway event, but, aside of one mechanic being killed, none of the accidents were of a serious nature. Samuel Dickson, mechanic for Arthur Greiner, met death in the early part of the race when the Amplex lost a tire and rim in the backstretch. Greiner escaped with a few bruises. Dave Lewis, helper for Grant in the Alco, had his leg broken when the Lozier hit Disbrow's Pope-Hartford; a mixup in the homestretch brought minor injuries to Harry Knight and his mechanic, John Fuller. Jagersburger's mechanic, C. L. Anderson,

STATISTICS OF THE 1911 500-MILE RACE

Open to cars with a piston displacement of 600 cubic inches or under.

Pos.	No.	Car and driver	Cylinder	Bore	Stroke	Piston displace.	Time	M. P. H.
1	32	Marmon, Harroun	6	4½	5	447.1	6:42:08	74.59
2	33	Lozier, Mulford	4	5⅝	6	544.6	6:43:51	74.29
3	28	Fiat, Bruce-Brown	4	5	7½	589.0	6:52:29	72.73
4	11	Mercedes, Wishart	5	5.1	7.1	580.2	6:52:57	72.65
5	31	Marmon, Dawson	4	4.5	7	445.3	6:54:34	72.34
6	2	Simplex, R. de Palma	4	5¾	5¾	597.2	7:62:02	71.13
7	20	National, Merz	4	5	5½	436.8	7:06:20	70.37
8	12	Amplex, Turner	4	5⅛	5	443.3	7:15:56	68.82
9	15	Knox, Belcher	6	5	4⅜	559.1	7:17:09	68.62
10	25	Jackson, Cobe	4	5	5½	431.9	7:21:50	67.90
11	10	Stutz, Anderson	4	4¾	5½	389.9	7:22:55	67.73
12	36	Mercer, Hughes	4	4⅞	5	300.7	7:23:32	67.62

Running at the finish—Firestone, Frayer; National, Wilcox; Mercer, Bigelow; Inter-State, H. Endicott; Velie, Hall; Benz, Knipper; Benz, Burman; Simplex, Beardsley; Fiat, Hearne-Parker; Pope-Hartford, Fox; Cutting, Delaney; Jackson, Tower; McFarlan, Marquette; Cole, W. Endicott.

Also started—National, Aitken, 125 laps; Case, Jones, 122; Case, Strang, 109; Apperson, Lytle, 82; Alco, Grant, 51; Buick, C. Basle, 46; Pope-Hartford, Disbrow, 45; Buick, A. Chevrolet, 30; Fiat, Bragg, 24; Jackson, Ellis, 22; Lozier, Tetzlaff, 20; Amplex, Greiner, 12.

Entered but did not start—Fal, Pearce; Fal, Gelnaw; Lozier, Van Gorder, scratched; McFarlan, Clemens; Velie, Gibbon, and Cole, Jenkins, failed to qualify.

STATISTICS OF THE 1912 500-MILE RACE

Open to cars with a piston displacement of 600 cubic inches or under.

Pos.	No.	Car and driver	Cylinder	Bore	Stroke	Piston displace.	Time	M. P. H.
1	8	National, Dawson	4	5	6¼	490.8	6:21:06	78.7
2	3	Fiat, Tetzlaff	4	5	7½	589.0	6:39:25	76.6
3	21	Mercer, Hughes	4	4⅝	5	300.7	6:33:09	76.3
4	20	Stutz, Merz	4	4¾	5½	389.9	6:34:40	76.0
5	18	Schacht, W. Endicott	4	4¾	5½	389.9	6:46:28	73.3
6	2	Stutz, Zengel	4	4¾	5½	389.9	6:48:31	73.2
7	14	White, Jenkins	6	4¼	5¾	489.4	6:52:38	72.7
8	22	Lozier, Horan	4	5⅜	6	544.6	6:59:38	71.4
9	9	National, Wilcox	4	5	7½	589.0	7:11:30	69.6
10	19	Knox, Mulford	6	4.8	5½	597.16	8:53:00	56.2

Also started—Mercedes, R. de Palma, 198 laps; Cutting, Burman, 156; Mercedes, Wishart, 92; Simplex, Dingley, 155; Lozier, Matson, 107; Stutz, Anderson, 79; Marquette, Leisaw, 63; Case, Hearne, 54; Firestone, Rickenbacker, 44; National, Bruce-Brown, 25; Lexington, Knight, 7; Opel, Ormsby, 5.

Entered but did not start—Mason, Lee Oldfield; Shambaugh, Shambaugh, and Continental, unnamed, failed to qualify.

was bruised in the same accident, and Bob Evans, mechanic for Tower in a Jackson, sprained an ankle as he jumped from the car.

A runaway race was expected, with the winner so far in front that interest would be lost before the fourth century has been passed, but the uncertainty that permeated the entire race was no better exemplified than by the fact that not one of the 80,000 persons who witnessed the spectacle left the grounds until the checkered flag dropped and Harroun was declared winner.

Grim, determined Harroun, riding alone in the yellow Wasp, with which he won the Schebler cup the year before, and with no mechanic to help him, was cool and confident as a leader. He was relieved after driving 150 miles of the race by Cyrus Patschke, who, in the 100 miles that he piloted the Wasp, put the Marmon in the lead from which it was never headed.

Fighting the puncture demon all the way, Mulford, having fourteen tire changes charged against him, developed a flat tire that forced him to run on the rim for some distance before reaching the pits. It required 2 minutes and 30 seconds to make the change and straighten the rim. Could he have avoided the last mishap he probably might have been the winner. Harroun's three changes were all on the same wheel. Besides the money winners, eleven other cars were running at the finish.

1912

A YEAR later an Indianapolis-made car and an Indianapolis driver, for the second time, captured the honors in the great American motoring classic. Joe Dawson driving a National, lead home a field composed of twenty-four cars, only ten of which finished the second 5-century grind. A new record was established by Dawson—78.7 miles an hour as against Harroun's 74.59 in 1911. Tetzlaff in a Fiat, Hughes in a Mercer, Merz in a Stutz, Endicott in a Schacht, Zengel in a Stutz, Jenkins in a White, Horan in a Lozier, Wilcox in a National and Mulford in a Knox, followed in the order named. As there were twelve prizes and only ten finished, the eleventh and twelfth purses were given to de Palma of the Mercedes, and Burman of the Cutting, the two with the greatest mileages.

The feature of the second 500-mile race was not so much the winning of Dawson as the losing of de Palma. The Italian's was the glory, for the Mercedes pilot was robbed of what appeared to be almost certain victory by the failure of his engine when he had barely more than two laps to go and when he was leading the field by an 11-minute margin. Swinging into the backstretch on his third from the last lap, de Palma's Mercedes was hitting on only two cylinders and running less than 30 miles per hour. Speed rapidly diminishing, the gray car came to a standstill at the 1½-mile post. Dawson seeing his rival in difficulty, opened his throttle wide, taking turns regardless of possible tire trouble. One hundred and eighty thousand pairs of eyes watched the far turn for de Palma, yet all were awake to the possibility of another American victory. Seconds that seemed minutes slipped into eternity and still no Mercedes. Dawson's big National was fairly eating up space, while thousands were asking: "Where is de Palma?" The green flag was waved, then the checkered flag and again it was an American triumph—again it was demonstrated that Yankee cars possessed greater stamina at a distance than their foreign rivals.

Enthusiasm over Dawson's victory was dampened to a certain degree by the feeling of intense interest in the fate of de Palma. Hopes were high that the Italian would get second place, but car after car got first the green and then the checkered flag; still the one man the crowd wanted to see was missing. Finally the gray bonnet showed around the last turn. No roar of exhaust, no skid on corner, gasoline was not furnishing the motive power. De Palma and his helper, Jeffkins, were pushing the car in to the starting line. Tragedy could be read in the face of de Palma—a $20,000 prize had slipped through his fingers—but he was game. "It's all a part of the game,"

START OF THE FIRST RACE ON THE SPEEDWAY, A 200-MILE EVENT IN 1910

STATISTICS OF THE 1913 500-MILE RACE

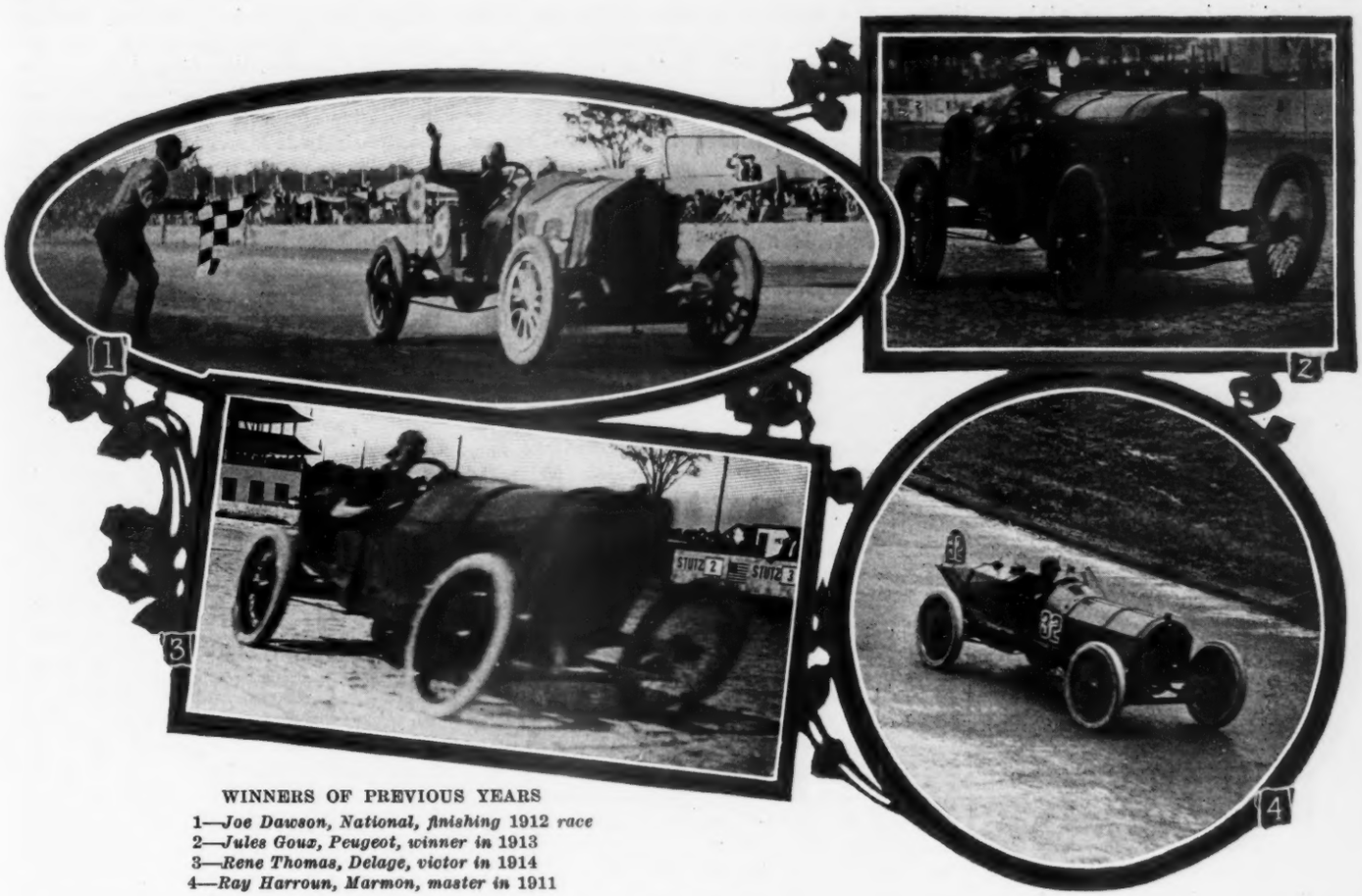
Open to cars with a piston displacement of 450 cubic inches or under.

Pos.	No.	Car and driver	Cylinder	Bore	Stroke	Piston displace.	Time	M. P. H.
1	16	Peugeot, Goux	4	4.246	7.875	448.13	6:35:05:00	76.92
2	22	Mercer, Wishart	4	4.370	5.000	299.00	6:58:13:40	73.49
3	2	Stutz, Merz	4	4.813	5.500	399.97	6:48:49:25	73.38
4	9	Sunbeam, Guyot	6	3.540	6.290	367.52	7:02:58:95	70.92
5	23	Mercedes-Knight Pilette	4	3.937	5.118	251.33	7:20:13:00	68.14
6	12	Gray Fox, Wilcox	4	4.750	5.500	389.90	7:23:26:55	67.65
7	29	Mercedes, Mulford	4	4.489	7.087	448.66	7:28:05:50	66.95
8	31	Case, Disbrow	4	5.100	5.500	449.00	7:29:09:00	63.08
9	35	Mason, Haupt	4	4.316	6.000	350.50	7:52:35:10	63.47
10	25	Tulsa, Clark	4	4.752	5.500	340.10	7:56:14:25	62.99

Running at the finish—Keeton, Burman.

Also started—Stutz, Anderson, 187 laps; Mason, Evans, 158; Anel, Liesaw, 148; Mercer, Bragg, 128; Henderson, Knipper, 125; Isotta, Tetzlaff, 118; Case, Nikrent, 67; Mason, Tower, 51; Isotta, Trucco, 39; Nyberg, Endicott, 23; Peugeot, Zuccarelli, 18; Mercer, R. de Palma, 15; Isotta, Grant, 14; Schacht, Jenkins, 13; Stutz, Herr, 7; Case, Endicott, 1.

Entered but did not start—Smada, Adams; Deltal, Dawson; Pennebaker, Pennebaker, scratched. Shambaugh disqualified for infraction of A. A. A. rules.



WINNERS OF PREVIOUS YEARS

1—*Joe Dawson, National, finishing* 1912 *race*
2—*Jules Goux, Peugeot, winner in* 1913
3—*Rene Thomas, Delage, victor in* 1914
4—*Ray Harroun, Marmon, master in* 1911

he said as he pushed the Mercedes across the tape and congratulated Dawson.

From the standpoint of accidents, the 1912 race was cleaner than its predecessor. Aside from the collapse of a right rear wheel on Burman's Cutting, followed by an upset, there was not a semblance of a serious mishap. Burman was slightly cut and bruised, but was more concerned with having been put out when he had such a good chance, than by his injuries. He was but 28 seconds behind Dawson at 168 laps, when the accident occurred.

The best speed records were made in the first century; de Palma making an average of 82.1 miles, Tetzlaff 81.5 and Dawson 80.7.

1913

WHETHER the last two digits of 1913 had anything to do with the outcome of the third international sweepstakes run at the Indianapolis motor speedway, so far as American cars and drivers were concerned, is a debatable question among the superstitious. Nevertheless, a Frenchman and a French car dethroned the American kings of speed and speed creations. One satisfaction remained at the end of the third race—Jules Goux's record with the Peugeot, heralded as "the fastest car in Europe," failed to beat the mark of 78.7 miles established by Dawson in 1912. The Peugeot won, but its average speed was 75.92 miles per hour. American cars also finished second and third, beating out seven other cars of European construction for place. It is also worthy of note that it was the Stutz and the Keeton that pushed the invader and not the two German Mercedes, the English Sunbeam and the three Italian Isottas.

Sensation bristled throughout the race. There was only one accident to mar the affair—Jack Tower in a Mason turning over on the south curve, injuring himself and his mechanic. Burman was a close contender, often forcing the Peugeot to look to its laurels, but delay caused by his carbureter catching fire was of too long duration to be regained. Mulford, piloting a German Mercedes, ran out of fuel on the backstretch, costing him a valuable half hour, which probably made a difference of several thousand dollars in his winnings. The tank ran dry at a most inopportune time, and, since the rules governing the race require the mechanics to go to the pits for more gasoline, his helper had to run a mile. Darting through the crowds in the infield, stumbling and falling through grass and high weeds, jumping fences and pools of sluggish water, he staggered to the pit, and, with the last breath before unconsciousness overcame him, delivered the message that Mulford needed more gasoline. The effort kept Mulford from being disqualified and enabled him to finish inside the prize money.

The 1913 race also was featured by a pyrotechnic finale, Charlie Merz, driving a Stutz, covering the last lap with the front of his car afire and with the mechanic, Martin, lying across the hood and beating at the flames with his bare hands.

Ten of the twenty-seven in the 1913 race had started in the two previous sweep-

STATISTICS OF THE 1914 500-MILE RACE

Open to cars with a piston displacement of 450 cubic inches or under.

Pos.	No.	Car and driver	Cylinder	Bore	Stroke	Piston displace.	Time	M. P. H.
1	16	Delage, Thomas.....	4	4.13	7.08	380.2	6:03:45	82.47
2	14	Peugeot, Duray	4	3.07	6.18	183.0	6:10:24	80.99
3	10	Delage, Guyot	4	4.13	7.08	380.2	6:14:01	80.20
4	6	Peugeot, Goux	4	3.94	7.08	345.0	6:17:24	79.41
5	3	Stutz, Oldfield	4	4.80	6.00	434.3	6:23:51	78.15
6	9	Excelsior, Christiaens...	6	3.80	6.20	446.6	6:27:24	77.44
7	27	Sunbeam, Grant	6	3.14	5.90	273.0	6:36:22	75.69
8	5	Beaver Bullet, Keene...	4	5.10	5.50	449.4	6:40:57	74.82
9	25	Maxwell, Carlson	4	4.20	8.00	445.3	7:02:42	70.96
10	42	Duesenberg, Rickenbacker	4	4.40	6.00	360.5	7:03:34	70.83

Finished—Mercedes, Mulford; Duesenberg, Haupt; Keeton, Knipper.
Also started—Puegeot, Boillot, 148 laps; Bugatti, Friedrich, 134; Burman, Disbrow, 128; Mercer, Wishart, 124; Stutz, Cooper, 118; Mercer, Bragg, 117; King, Klein, 87; Braender, Chandler, 69; Gray Fox, Wilcox, 67; Mason, Mason, 66; Burman, Burman, 47; Marmon, Dawson, 46; Stutz, Anderson, 42; Isotta, Gilhooley, 40; Maxwell, Tetzlaff, 38; Sunbeam, Chassagne, 20; Ray, Brock, 5.

stakes, but only two cashed in all three. Merz in a National was seventh in 1911, fourth in a Stutz in 1912, and third in a Stutz in 1913. Mulford, driving a Lozier in 1911, was second; in a Knox, tenth, in 1912; in a Mercedes, seventh, in 1913.

1914

A FUED of long standing, which the road races of Europe had been unable to settle, brought the French Peugeot and Delage over the seas to continue their battle in the fourth speedway event held at Indianapolis. And the car that won the third 500-mile race found a tartar in the Delage, driven by Rene Thomas, crossing the tape 6 minutes and 39 seconds behind the winner. Although the Peugeot averaged 80.99 miles per hour—5.07 miles faster than the year previous—the Delage ground out the 500 miles at the rate of 82.47 miles per hour—the best record yet established.

In settling the fued, the hopes of the American field of entrants that one of their number might be lucky enough to pull down the big end of the $50,000 purse were dashed. Added to this came the humiliating knowledge that foreign entries won more than 80 per cent of the purse.

Thomas, who had promised before the start to make 83 miles per hour, got the checkered flag when he was leading the field by six laps. Arthur Duray in a 183-inch Peugeot was second. Guyot, Thomas' Delage teammate, was running two laps back of Goux, winner the previous year, while Oldfield, the only American within gunshot, was twelve laps behind.

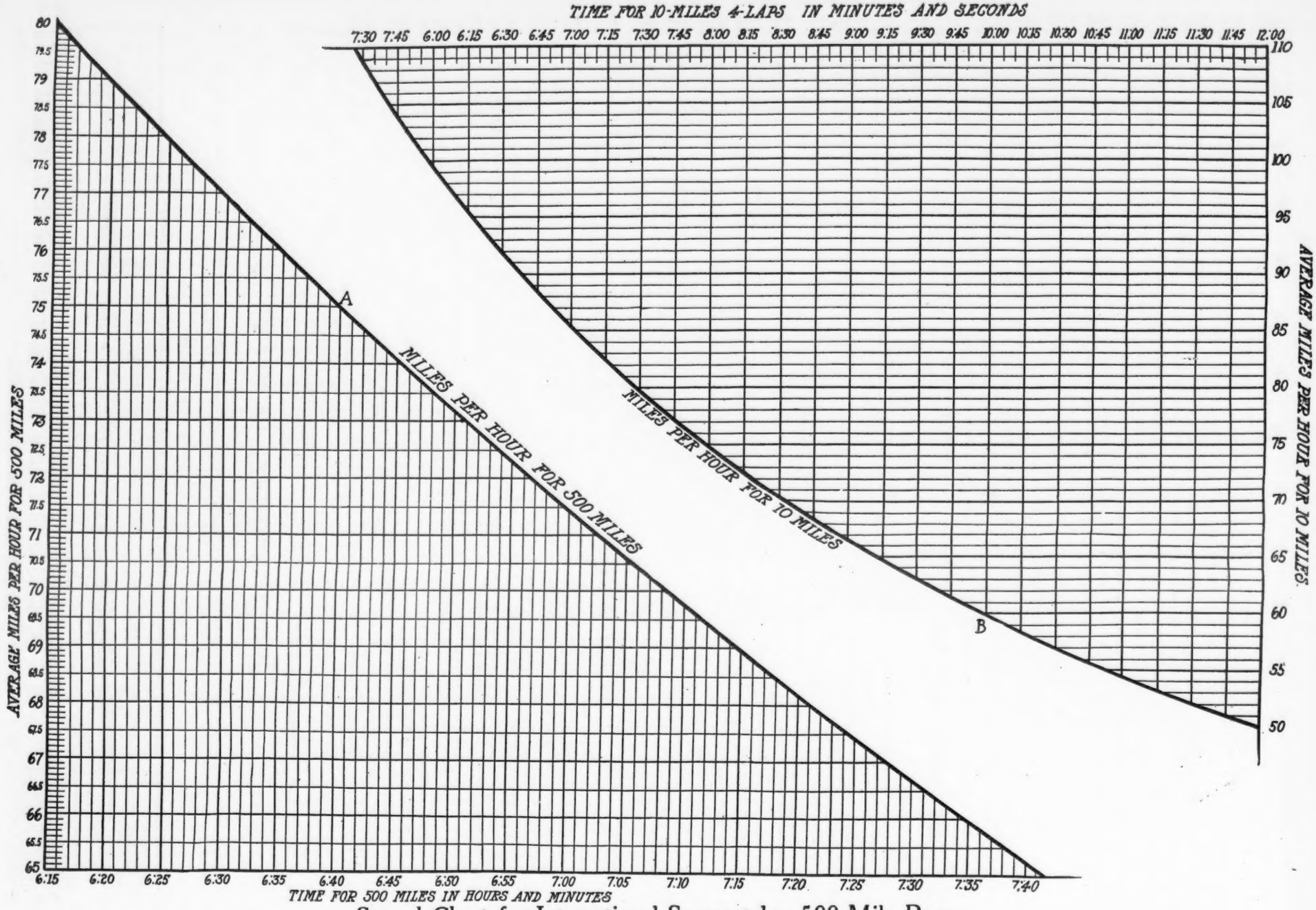
In a way the 1914 race differed from those previous in that it lacked the sensational features that thrilled the multitudes of other years.

The sensation of the race was the Marmon-Isotta mixup. Gilhooley, driving the Italian Isotta, got into the race through the eleventh-hour withdrawal of de Palma's Mercedes. Warning given by officials, to the effect that he must not hold the outside of the track while running at comparatively low speed, seemed to pass in one ear and out the other. He swung into the south turn, running high up, when a tire blew, capsizing the Italian car. Gilhooley's dazed mechanic was crawling up the bank. Wilcox in the Gray Fox dodged him and Dawson started to cut through between the mechanic and the outside wall when he saw he could not make it without hitting the man.

In an effort to swing back and avoid injuring the already dazed mechanic, Dawson's Marmon turned over, flinging him and his mechanic to the track. Dawson's life was despaired of for a time but fate decreed that there should be no fatalities in the 1914 race.

Indianapolis Speedway Time Chart—Miles Per Hour Equivalents

MILES PER HOUR	1 Lap 2½ Miles	4 Laps 10 Miles	20 Laps 50 Miles	40 Laps 100 Miles	80 Laps 200 Miles	120 Laps 300 Miles	160 Laps 400 Miles	200 Laps 500 Miles	MILES PER HOUR
	Min. Sec.	Min. Sec.	Min. Sec.	Hr. Min. Sec.	Hr. Min. Sec.	Hr. Min. Sec.	Hr. Min. Sec.	Hr. Min. Sec.	
60	2 30.00	10 00.0	50 00	1 40 00	3 20 00	5 00 00	6 40 00	8 20 00	60
61	2 27.54	9 50.2	49 11	1 38 22	3 16 43	4 55 04	6 33 27	8 11 48	61
62	2 25.16	9 40.6	48 23	1 36 46	3 13 33	4 50 19	6 27 06	8 03 52	62
63	2 22.86	9 31.4	47 37	1 35 14	3 10 29	4 45 43	6 20 57	7 56 11	63
64	2 20.63	9 22.5	46 52	1 33 45	3 07 30	4 41 15	6 15 00	7 48 45	64
65	2 18.46	9 13.8	46 09	1 32 18	3 04 37	4 36 55	6 09 14	7 41 32	65
66	2 16.36	9 05.4	45 27	1 30 55	3 01 49	4 32 44	6 03 38	7 34 33	66
67	2 14.33	8 57.3	44 47	1 29 33	2 59 06	4 28 39	5 58 13	7 27 46	67
68	2 12.35	8 49.4	44 07	1 28 14	2 56 28	4 24 42	5 52 56	7 21 11	68
69	2 10.43	8 41.7	43 29	1 26 57	2 53 54	4 20 52	5 47 50	7 14 47	69
70	2 08.57	8 34.3	42 52	1 25 43	2 51 26	4 17 09	5 42 51	7 08 36	70
71	2 06.76	8 27.0	42 15	1 24 30	2 49 00	4 13 31	5 38 02	7 02 32	71
72	2 05.00	8 20.0	41 40	1 23 20	2 46 40	4 10 00	5 33 20	6 56 40	72
73	2 03.29	8 13.2	41 06	1 22 12	2 44 23	4 06 35	5 28 46	6 50 58	73
74	2 01.62	8 06.5	40 32	1 21 05	2 42 10	4 03 15	5 24 19	6 45 24	74
75	2 00.00	8 00.0	40 00	1 20 00	2 40 00	4 00 00	5 20 00	6 40 00	75
76	1 58.42	7 53.7	39 28	1 18 57	2 37 54	3 56 51	5 15 47	6 34 44	76
77	1 56.88	7 47.5	38 58	1 17 55	2 35 51	3 53 46	5 11 41	6 29 37	77
78	1 55.38	7 41.5	38 28	1 16 55	2 33 51	3 50 46	5 07 42	6 24 37	78
79	1 53.92	7 35.7	37 58	1 15 57	2 31 54	3 47 51	5 03 48	6 19 45	79
80	1 52.50	7 30.0	37 30	1 15 00	2 30 00	3 45 00	5 00 00	6 15 00	80
81	1 51.11	7 24.4	37 02	1 14 04	2 28 09	3 42 13	4 56 18	6 10 22	81
82	1 49.76	7 19.0	36 35	1 13 10	2 26 20	3 39 31	4 52 41	6 05 51	82
83	1 48.43	7 13.7	36 09	1 12 17	2 24 35	3 36 52	4 49 09	6 01 27	83
84	1 47.14	7 08.6	35 43	1 11 26	2 22 51	3 34 17	4 45 43	5 57 09	84
85	1 45.88	7 03.5	35 18	1 10 35	2 21 11	3 31 46	4 42 21	5 52 56	85
86	1 44.65	6 58.6	34 53	1 09 46	2 19 52	3 29 18	4 39 04	5 48 50	86
87	1 43.45	6 53.8	34 29	1 08 58	2 17 56	3 26 54	4 35 52	5 44 50	87
88	1 42.27	6 49.1	34 05	1 08 11	2 16 22	3 24 33	4 32 44	5 40 55	88
89	1 41.12	6 44.5	33 42	1 07 25	2 14 50	3 22 15	4 29 40	5 37 05	89
90	1 40.00	6 40.0	33 20	1 06 40	2 13 20	3 20 00	4 26 40	5 33 20	90
91	1 38.90	6 35.6	32 58	1 05 56	2 11 52	3 17 48	4 23 44	5 29 40	91
92	1 38.83	6 31.3	32 37	1 05 13	2 10 26	3 15 39	4 20 52	5 26 05	92
93	1 36.77	6 27.1	32 15	1 04 31	2 09 02	3 13 33	4 18 04	5 22 35	93
94	1 35.74	6 23.0	31 55	1 03 50	2 07 40	3 11 29	4 15 19	5 19 09	94
95	1 34.74	6 18.94	31 35	1 03 09	2 06 19	3 09 28	4 12 38	5 15 47	95
96	1 33.75	6 15.0	31 15	1 02 30	2 05 00	3 07 30	4 10 00	5 12 30	96
97	1 32.78	6 11.1	30 56	1 01 51	2 03 43	3 05 34	4 07 25	5 09 17	97
98	1 31.84	6 07.3	30 37	1 01 13	2 02 27	3 03 20	4 04 54	5 06 07	98
99	1 30.91	6 03.6	30 18	1 00 36	2 01 13	3 01 49	4 02 25	5 03 02	99
100	1 30.00	6 00.0	30 00	1 00 00	2 00 00	3 00 00	4 00 00	5 00 00	100



Speed Chart for International Sweepstakes 500-Mile Race

To find average speed for 10 miles use upper chart. If car makes 10 miles in 10 minutes flat, enter chart at 10:00 at top, drop to curve B and go right to outside, reading 60 miles per hour. To find average speed for race, 500 miles, use lower chart. If car makes distance in 6 hours 40 minutes, enter chart at 6:40 at bottom, go up to A and left to 75 miles per hour

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Debut of 300-Inch Cars

BY the end of this week, another chapter will have been written in the annals of speedway racing in America, the fifth annual 500-mile race being sure to add some new coloring to the sport in this country. That cutting from 450 to 300 cubic inches will raise the average speed for the five centuries now seems assured as the qualifying trials have shown that cars are capable of higher travel than a year ago, 300 cubic inches today producing more speed than 450 in 1914. The average of last year undoubtedly will be raised if the luck factor, so far as weather and freedom from accidents are concerned, is equal to that of a year ago. The qualifying speeds this year are averaging higher than those of 1914 and if the lap record of last year is not eclipsed, the average qualifying speeds of last year will be higher.

HIGHER speeds this year with 300 cubic inches piston displacement have not been attained without much labor on the part of engineers and much patient testing by drivers and mechanics. The smaller motors are only capable of higher speeds because their crankshaft speeds are higher than those used in the 450-inch sizes. The power of a motor is generally dependent upon its ability to consume explosive mixture. Naturally, getting the requisite amount of gas into the cylinders has been the big problem of the designers. With some, this has been accomplished by using larger valves. Others have used two intakes and two exhausts for each cylinder. Again, others have aimed at higher efficiencies by improved manifold design and lighter pistons and connecting rods.

AFTER all is said, the net result obtained is higher motor speeds. These higher motor speeds have brought with them many difficulties with which the drivers have had to contend. Inadequate motor lubrication has given rise to a host of troubles, such as burned out bearings of crankshaft and connecting rods. In other cases, pistons have seized and in addition, piston rings have been giving trouble.

DESIGNERS and drivers alike have learned that getting more power is most necessary when the piston displacement has been cut down, but with the more power is the need of strengthening the many parts to adequately care for this additional power. The use of lighter pistons, made either of steel forgings, steel castings or castings of light metal alloys, has greatly aided in getting higher motor power, but the proper clearance to use with these new pistons and higher speeds is yet an unsolved problem with a few makers. Some have had to use steel piston rings. These have scored cylinders and brought about other troubles. Engineers have found that with light-metal pistons they have too much clearance between the piston and the cylinders and the compression of the motor has been reduced too much.

THE use of ball bearings to carry the crankshaft has brought new problems in the matter of lubrication, and added to this is the question of overhead camshaft, which has brought with it the work of adequate oiling of the shaft and its valve rocker mechanism.

WITH all of these new problems confronting them, it is not surprising that many of the entrants are not ready with their cars and that the cars are more poorly prepared than at any of the last two or three 500-mile races. Each entrant with a new design or motor came face to face with many unexpected problems after the cars were put on the road. The higher motor speeds have introduced a new regime of difficulties, many of which were not dreamed of before the cars were tested a few weeks ago. Because of such conditions, it is highly possible that some of the cars will not give a good account of themselves.

Drivers' Qualification Tests

WHY not have on the Saturday afternoon previous to the 500-mile Indianapolis race a special speedway race of 150 miles, to be known as the drivers' qualification trials, for the express benefit of new drivers who are anxious to demonstrate that they are competent to handle fast cars in the Hoosier classic?

EACH year the officials of the race are confronted with the problem of passing on new drivers, in order to determine if they are competent to handle cars in such a contest. Many of these drivers have had only limited speed experience on half-mile tracks or in hill climbs and are not ready to join the fast company of the speedway. These drivers are generally barred and this action invariably results in certain criticism. If qualifying trials were held and only new drivers were admitted, it would give the officials an excellent opportunity to develop a new crop of pilots. This not only would raise the standard of racing in this country but would go far in eliminating the undesirable accident factor.

Training the Race Driver

BEFORE our big athletic contests, the participants spend many weeks in careful training. They walk, run, live on a certain diet, take a certain number of hours of sleep and follow out many other restrictions that are considered necessary for careful preparation for the crucial test of strength and nerve.

HOW different with so many of our motor car racing drivers, who before an 8-hour gruelling test like the 500-mile race, give scarcely a thought to careful and systematic physical training! Few of them drive steadily for more than 100 miles at one time. Compare this with the runner training for a marathon race. Each day he covers a certain distance, increasing it from day to day until the period for hard training ends. Our drivers, on the other hand, spend most of their time working on their cars, often wasting sleep in this labor. True, such labor develops their strength, but it is questionable if they could not greatly improve their physical condition by a carefully planned program of exercise, diet and sleep.

Admitting Motor Cars to Yellowstone Park a Problem

Horses and Gasoline Will Not Mix and Federal Authorities Have Trouble Fixing a Schedule for Traffic

WASHINGTON, D. C., May 21—The plan which Colonel Brett, the superintendent of Yellowstone national park, is now working out preparatory to its opening to motorists August 1, will give entrance to the park during certain hours to motor cars alone, and during certain hours to horse-drawn vehicles alone. All traffic must be in one direction—opposite to the hands of the clock. For this reason it is highly desirable that motorists carefully study out their plan of procedure before entering the park in order not to pass unvisited anything to which they will wish to return. The rules will not permit them to reach that spot except by entirely encircling the park, a journey of more than 100 miles.

The roads are too narrow to accommodate extensive traffic, and the horses, which heretofore have drawn all vehicles of every sort in Yellowstone Park, are not accustomed to motor cars; probably the big majority of them have never seen one. The danger of these animals taking fright on the narrow roads while conveying large wagonloads of visitors is one which necessitates extremely careful management. Indeed, it is the concensus of expert opinion that until the horses can become accustomed to motor cars, it will not be possible to allow the horses and the motor to meet in the park.

TO DEDICATE YUMA BRIDGE

Los Angeles, Cal., May 21—Officials of the Los Angeles chamber of commerce and the Automobile Club of Southern California left by motor car for Yuma, Ariz., this morning, to attend the dedication of the new $75,000 bridge over the Colorado river at Yuma, Ariz., which is to take place Sunday. The car in which the official party rode out of this city was piloted by Frank Verbeck, veteran Phoenix racer and winner of the Panama-Pacific road race in 1912.

FIRST MOTORIST TO REACH SEATTLE

Seattle, Wash., May 22—To J. H. Young, a realty dealer of Chicago, belongs the distinction of being the first motorist to drive across the continent to Seattle this season. Accompanied by his family and chauffeur, Young arrived in Seattle May 18. The party left Chicago April 2 and followed the Yellowstone trail and National Parks highway to Spokane and thence drove across the state of Washington through Wenatchee, Blewett Pass and Snoqualmie Pass.

The roads from Chicago to Puget Sound are in good condition, considering the time of the year, said Young. In the Dakotas, the roads were somewhat muddy, but with the coming of dry weather they will be in good condition. A ferry is now in operation across the Little Missouri river at Mobridge, Mont., eliminating one of the obstacles that worried tourists. Blewett Pass, in Washington, is in good shape. Snoqualmie Pass is not yet open to traffic.

PLAN MOTOR STAGE TO DIXIE

Atlanta, Ga., May 21—Atlanta to New York by motor bus is a new project about to be started by local promoters. This line will reach New York by way of Washington. The fares charged will be the same as those now in vogue by the steam or trolley lines running parallel to the motor route.

The promoters intend to make Atlanta the hub of a number of overland motor lines, extending northwest to link up with the metropolis of the southeast such cities as Richmond, Washington, Baltimore, Philadelphia and New York.

The first lines will be from Atlanta to Aiken, S. C., on the northeast; Montgomery, on the southwest; and Chattanooga on the northwest, these to be initial links in the lines to New York and New Orleans.

See America First — See America Now

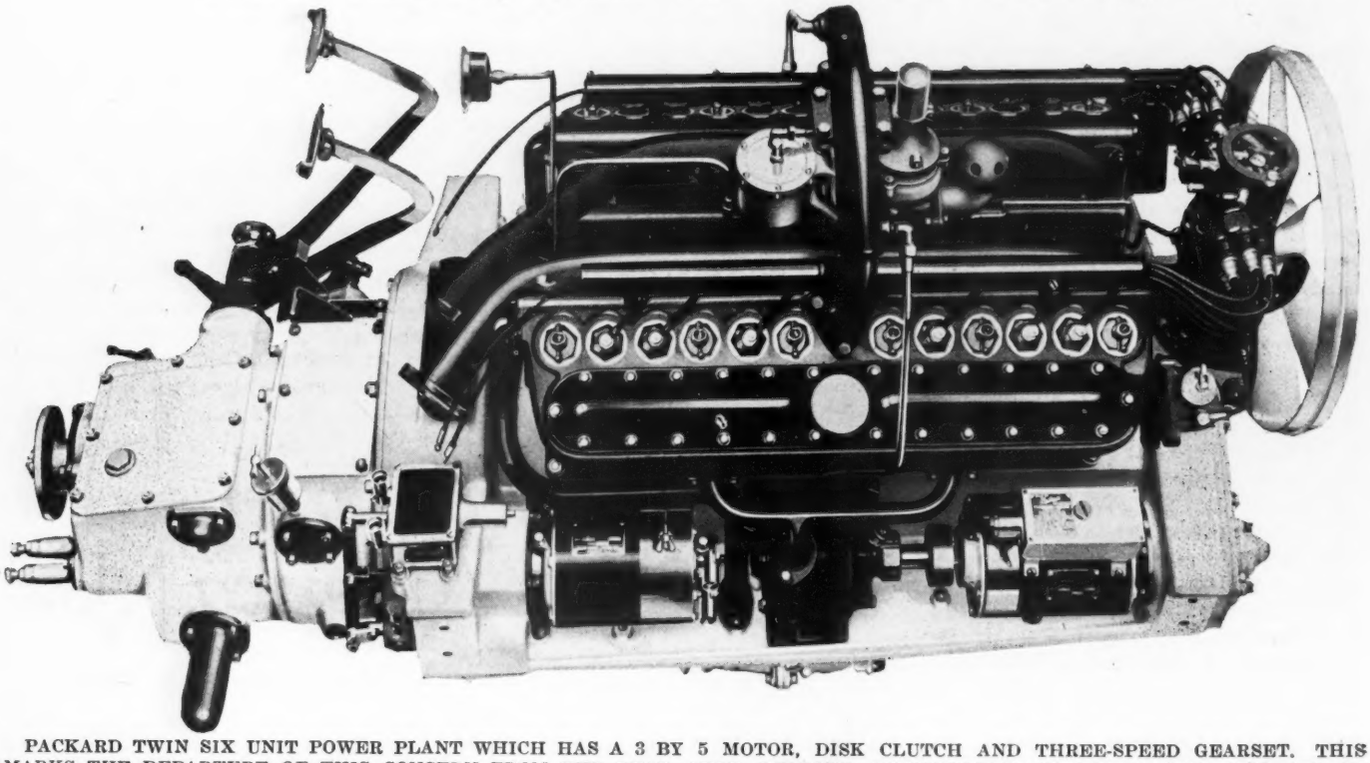
EDITOR'S NOTE—This is the twenty-eighth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the picturesque points of interest in their own country.

NO. 28. OLD TAYLOR HOTEL AT WINCHESTER, VA., MADE FAMOUS DURING THE CIVIL WAR

Down in the Shenandoah valley, where a half century ago epochal history was in the making, among other relics of the Civil war, stands the Old Taylor hotel at Winchester, Va., a city made famous by General Philip Henry Sheridan in that this was where he began his famous ride to Cedar Creek, "20 miles away," and turned what promised to be defeat at the hands of Early into victory for the north. The Old Taylor hotel was the scene of much battle-planning in the day of the Rebellion, both by officers of the Confederate and Union armies. History has it that this now famous structure changed hands over seventy times during the 4-year conflict, first being occupied as a headquarters by the officers of the Union army and then by the Confederates, according to the way in which the tide of battle ran.

Packard Is World Innovation in Touring Car Production

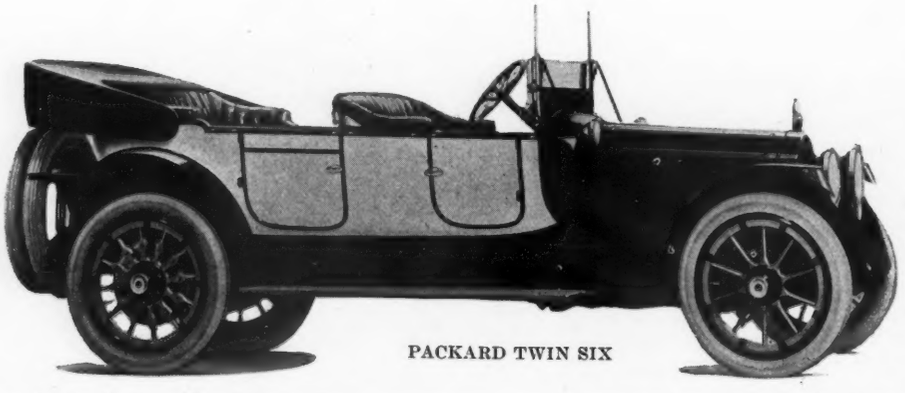
Twin Six Has a 3 by 5 Motor—Rear Axle Gearset Discontinued



PACKARD TWIN SIX UNIT POWER PLANT WHICH HAS A 3 BY 5 MOTOR, DISK CLUTCH AND THREE-SPEED GEARSET. THIS MARKS THE DEPARTURE OF THIS CONCERN FROM THE REAR AXLE GEARSET CONSTRUCTION WHICH IT HAS ADHERED TO FOR MANY YEARS. THE TWELVE CYLINDERS ARE IN BLOCKS OF SIX SET AT 60 DEGREES

PARALLELING in importance the 500-mile race at Indianapolis, is the announcement just made by the Packard Motor Car Co. that it will market a twelve-cylinder model for 1916, leaving the former sixes to rest peacefully in the discard. Packard's bold announcement is the first of its kind ever made in the world and it marks a decided step toward America's supremacy in the field of motor car engineering. Twelves have been constructed before this, but never has a concern perfected such a motor so as to make it practical for use in regular stock models.

There have been many rumors concerning the Packard intentions for the coming year and a car with twelve cylinders has been anticipated in many quarters. But the Packard Twin Six, as it will be called, is something more than a doubling up of the design used in 1915, for the motor is a completely new job, of high-speed capability and with the most recent practice as to lightness of reciprocating parts, large valve opening and so on. It is an extremely neat chassis in appearance, has good accessibility and is a noteworthy combination of racing motor power with quietness. Never before have the principles of high-speed motor design been applied to a touring car engine of so large a size as this new Packard and it needs but a little handling of the car to realize that the result is not merely encouraging, but in excess of all possible expectation.



PACKARD TWIN SIX

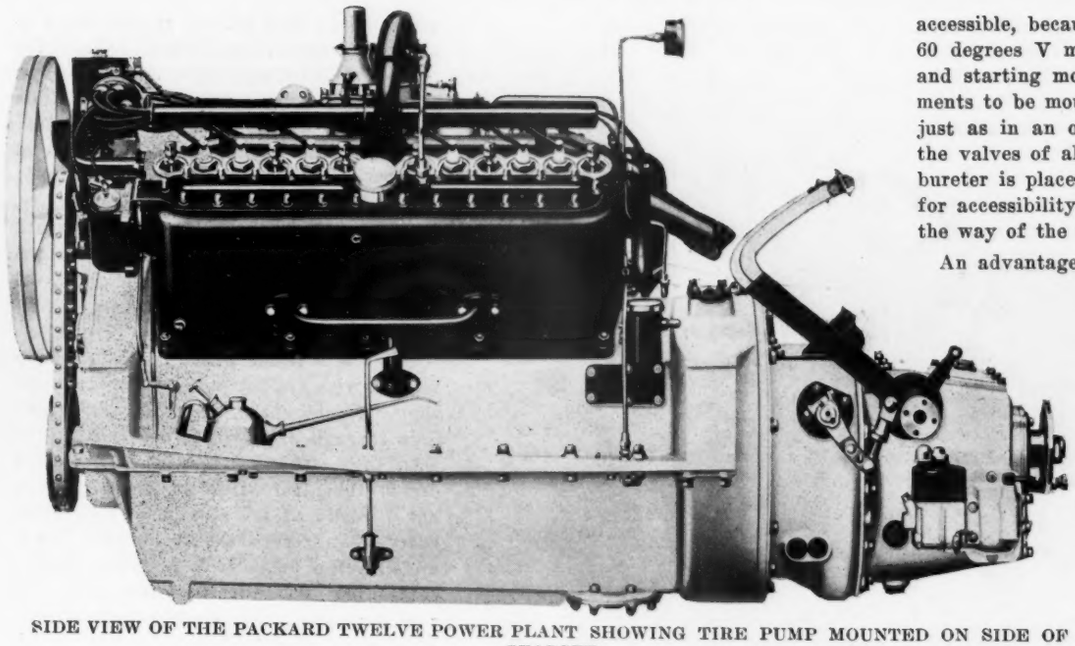
PACKARD TWELVE ATTRACTIONS

Cylinders set at 60 degrees
One camshaft with twenty-four cams
One carbureter in the V
Thermostatic water control
Two wheelbase lengths, 125 and 135 inches
Side-by-side connecting rods
Delco ignition, Bijur starter
Unit power plant displaces former construction

The Packard company has done more than announce a twelve. It has announced a model without a rear axle gearset. Ever since the concern announced a four-cylinder model the rear axle type of gearset has been adhered to. Another decided change is that from a progressive type to a selective, the former having been used by Packard for about 9 years.

Motor Turns Over at 3,000 r. p. m.

The dimensions of the new Packard are 3 by 5, giving a piston displacement of 424 cubic inches and it will turn at 3,000 r. p. m. or even more, though the power at low speed is such that the high end of the range seldom is needed. For the pistons an alloy of aluminum is employed, and the connecting rods are machined all over so that the reciprocating weight is very small. Actually the pistons weigh 17 ounces complete with rings; and the upper



SIDE VIEW OF THE PACKARD TWELVE POWER PLANT SHOWING TIRE PUMP MOUNTED ON SIDE OF GEARSET

half of the connecting rod, which is reckoned as a reciprocating mass, weighs 8.5 ounces only; this making the very small total mass of 1 pound 9½ ounces. We know that the vibration which may be present in a six-cylinder is due to the weight of the pistons, etc., causing deflections in the crankshaft. Compare this little piston weight with that in the Packard six-38. This car has a motor displacement of 414 cubic inches or only 10 less than the present model, but each piston weighs 4 pounds 2 ounces and the total reciprocating mass 5 pounds 8 ounces. Thus it is easy to see wherein lies the extraordinary smoothness of the twin six.

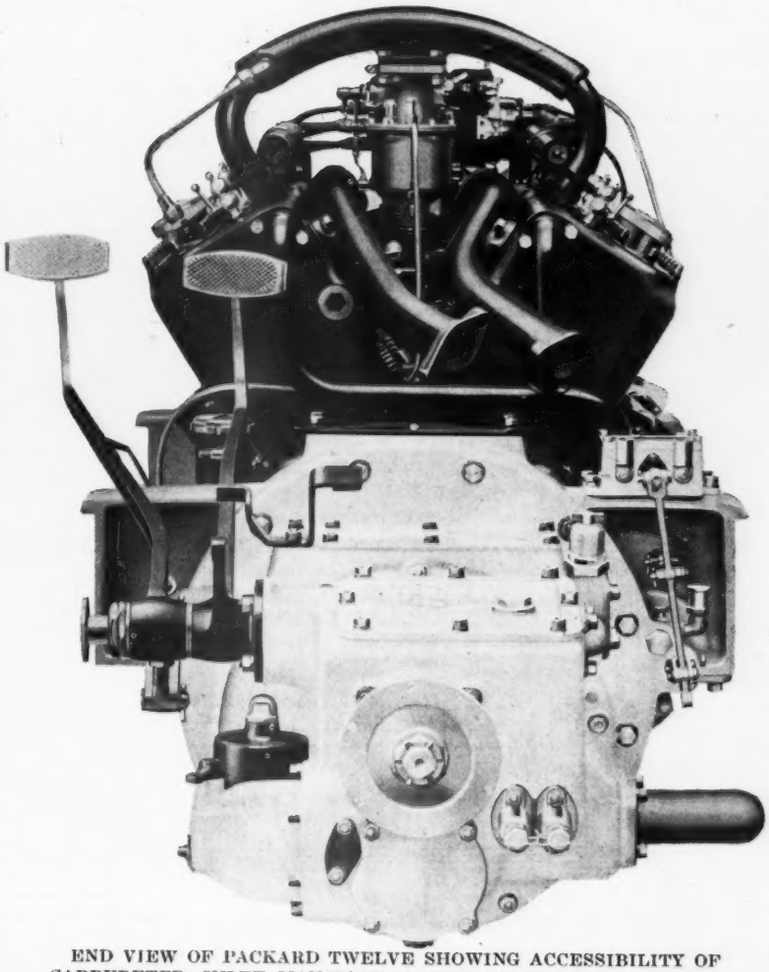
To appreciate this smoothness in combination with high power it is essential to ride in the car. All that one can say is that the twelve is an attempt to combine the advantages of six and eight and to simultaneously eliminate many of the disadvantages of both. To what extent the attempt has succeeded is a matter for each man to decide for himself, but for large engines, a very short experience with the twelve on the road is sufficient to prove to the average motorist that there is much more in the system than anyone would have imagined.

The Packard motor has two block castings of six cylinders, each set on an aluminum crankcase at 60 degrees, so as to give the best torque which is obtained with even intervals between the explosions. The valves, operated by a single camshaft, are located between the cylinders in ordinary L-head fashion, but they are remarkably accessible, because the narrowness of the 60 degrees V motor allows the generator and starting motor and the other attachments to be mounted alongside the engine just as in an ordinary four. This clears the valves of all obstruction and the carbureter is placed high enough to be ideal for accessibility in itself and quite out of the way of the valves.

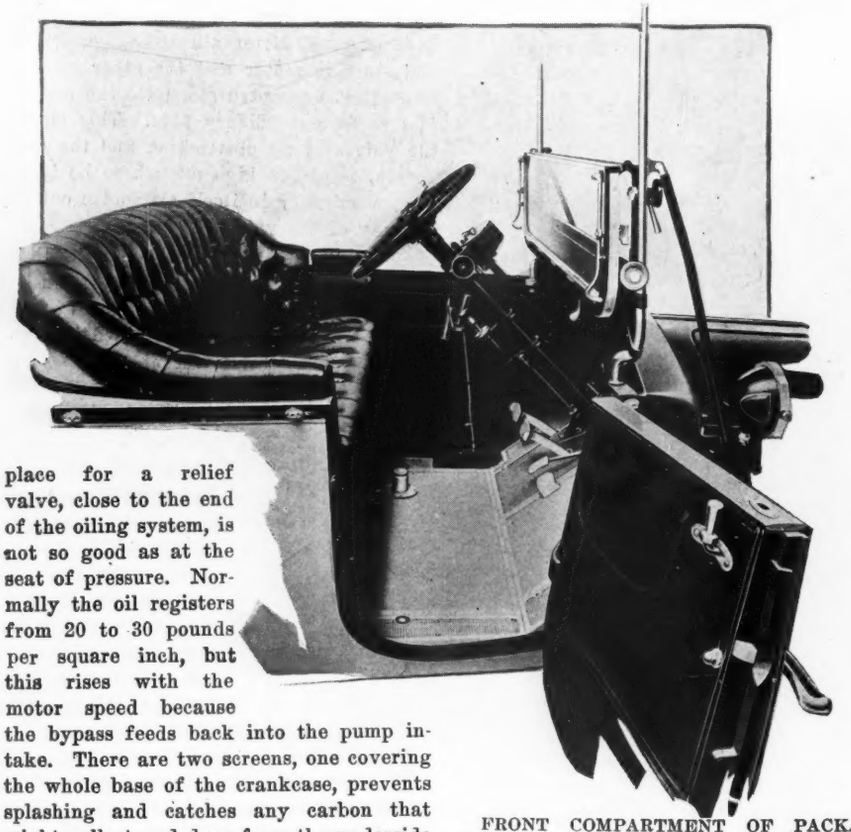
An advantage of small cylinders is that a high compression can be used and a good fuel efficiency obtained thereby. On a recent run in this car the average for nearly 200 miles was 11 miles per gallon. To get this small cylinder with a high enough compression calls for a small combustion space, while the need for large valves demands the opposite. In order to conciliate these two warring conditions the valves are inclined as regards the cylinder bore which gives room for big valves and yet calls for only a small area of pocket.

To allow the motor to be used at continued high speed, or to prevent such use from injuring it, a high pressure oiling system is essential. So that there shall be no risks run whatever, oil is carried up to the piston pins by little pipes that lie inside the H section of the connecting rods, but the outstanding feature is the provision of separate leads for oil within the crankshaft. As there are only three main crankshaft bearings, this being quite sufficient for so short a length, there is necessarily one crankpin in each half of the shaft that is not adjacent to a main bearing. To prevent the nearest connecting rods getting all the oil, the crankshaft and crankpins are drilled out with fairly large holes and these holes are divided, by driving in lengthwise, little strips of steel cut with saw edges so that they bite in and are tight when driven home. This divides the crankshaft interior into two parts and the small holes are drilled so that each crankpin obtains a separate feed of lubricant.

For the supply of oil there is a wide gear pump with helical gears, for quietness, and this has a bypass within the pump itself. It is thought that the usual



END VIEW OF PACKARD TWELVE SHOWING ACCESSIBILITY OF CARBURETER, INLET MANIFOLD WATER PIPING AND EXHAUST MANIFOLDS



FRONT COMPARTMENT OF PACKARD TWELVE SHOWING NEW CENTRALIZED CONTROL UNIT

place for a relief valve, close to the end of the oiling system, is not so good as at the seat of pressure. Normally the oil registers from 20 to 30 pounds per square inch, but this rises with the motor speed because the bypass feeds back into the pump intake. There are two screens, one covering the whole base of the crankcase, prevents splashing and catches any carbon that might collect and drop from the underside of the pistons. The other in between the pump outlet and the internal manifold and this screen can be withdrawn for cleaning without losing any oil. Besides the crankshaft and piston pin leads, oil under pressure is taken to camshaft, generator shaft, air and oil pump shafts and the timer shaft. Overflow from the generator shaft cares for the Morse chain at the front and every other part is thought of.

Unique Chain Adjustment

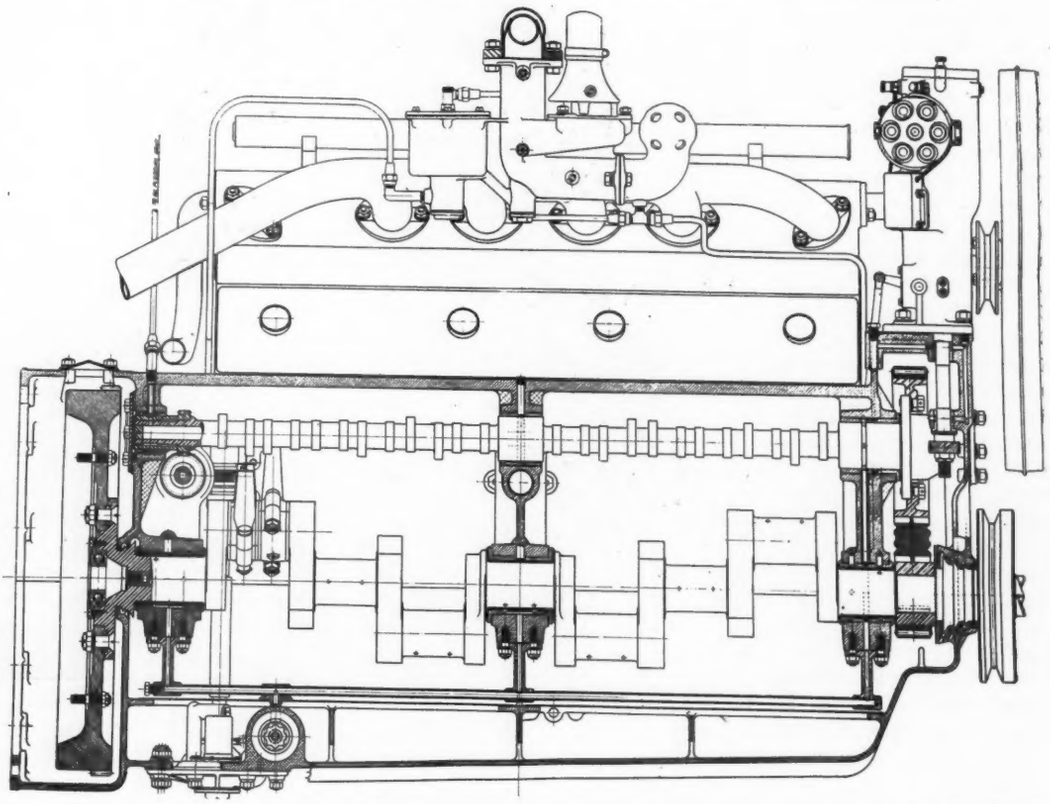
The chain used for the driving of camshaft and generator is adjusted in a unique manner without moving the generator or disturbing the other centers by the novel and somewhat daring method of allowing the generator sprocket to drive the generator through a large coupling. The sprocket rides on the outside of an eccentric bushing surrounding the generator driving spindle, so that turning the bushing shifts the sprocket relative to the other sprockets, but does not move the generator. To prevent the occurrence of slack in this coupling, which always is working over a small range, the tongues are tapered and wear is taken up automatically in the event of any wear taking place.

The lightness thought essential for pistons and connecting rods has been extended to the other reciprocating parts, as valves and push rods are as innocent of weight as high-tensile alloy steels can make them. This reduces any tendency to noise and, what is better still, permits the use of constant-acceleration, hollow-faced cams. Only a light valve will follow this sort of cam with a reasonable spring that can shut the valve quietly. The total weight of valve, cotter and tappet is 9½ ounces, against 15½ for the present six. The valve diameter in the clear beneath the head is 1.5 inch, the method for adjusting the tappet is normal and the usual cover plate is employed.

One Water Pump Used

There is a single water pump driven in tandem with and behind the generator, the supply reaching the other block of cylinders through a large passage cast in the crankcase. This passage is lined with a drawn tube, forced in so as to prevent any porosity of the aluminum, permitting entry of water to the crankcase. Made up with the pump is a large thermostat controlling two throttle valves on the radiator and bypass systems respectively. This is no novelty but it is carried out with great compactness.

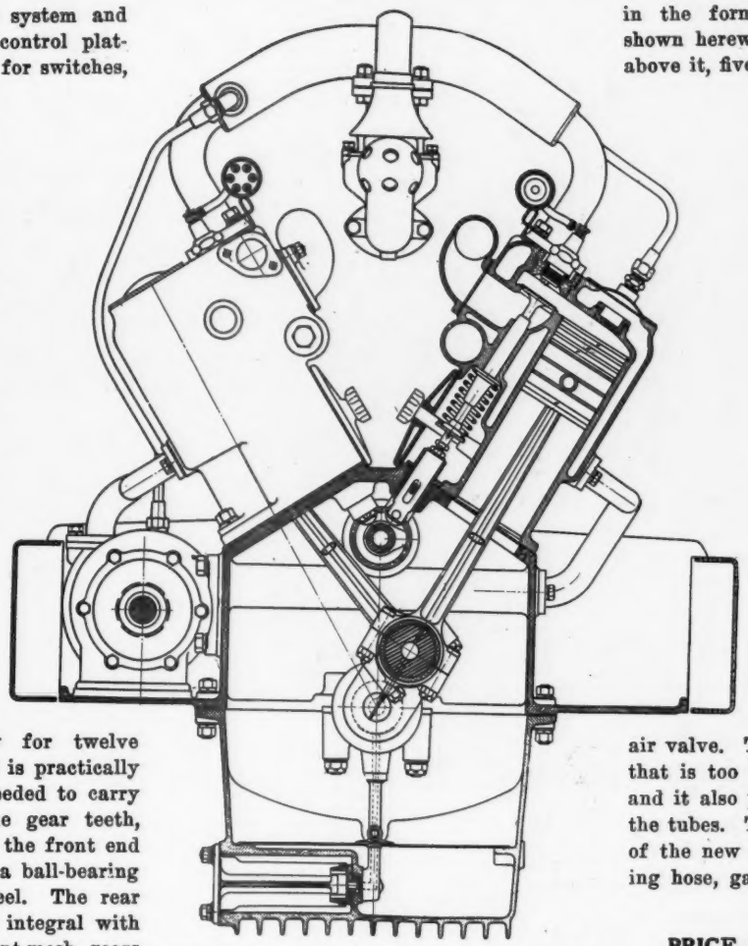
In starting and lighting, the Bijur constant-voltage, two-unit system is retained and the location of the parts is shown in the drawings. Ignition is by a timer with both automatic and hand advance, this being a special Delco product, with one breaker can operating two complete six-cylinder systems. This insures good synchronization and good spark at high speed and long duration of contact. This timer is the only ignition apparatus, but it can draw current from the main battery or from reserve dry batteries.



SECTION THROUGH PACKARD TWELVE SHOWING POSITION OF THE SINGLE CAMSHAFT, ALSO SIDE-BY-SIDE ROD ATTACHMENT

The wiring is a two-wire system and there is the usual Packard control platform on the steering columns for switches, but this is now smaller and neater. The very useful feature of having one switch which gives head or side lights alternatively with a single finger movement is retained. Owing to the even torque of the twelve cylinders the starting motor cranks at a steady speed and very quietly; there is none of the rising and falling wail of gearing found with several four-cylinder jobs.

For the first time the Packard company has broken away from the rear axle gearset with which it has been identified so long and the illustrations show the small unit gearset which has replaced the old design. About the clutch there is little new, the dry plate working just as smoothly for twelve cylinders as for six. There is practically no more flywheel than is needed to carry the clutch and to take the gear teeth, for the cranking motor and the front end of the clutch shaft runs in a ball-bearing spigot housed in the flywheel. The rear end of this same shaft has integral with it, the pinion of the constant-mesh gears in the gearset, which is hollow and contains a Hyatt roller bearing that forms the gearshaft spigot. All other bearings in the gearset are large-diameter ball, steel-protecting flanges guarding the races against entry of dirt or other foreign bodies.



END SECTION THROUGH PACKARD MOTOR

Selective Gearset Used

The gear shift is selective and the lever and emergency brake lever are still carried on the left side of the chassis and the gearset contains a simple but effective interlocking device, which holds one shifting arm when the other is in use.

In coming to the unit power plant the makers point out that the even torque of the twelve eliminates all risk of rattle in the constant mesh gears and they are taking pains to lighten the axle as much as possible to reduce unsprung weight to a minimum and so get the best of the new arrangement.

This lightness is obtained by using the simplest design of rear axle with a pressed steel casing and road wheels mounted on the ends of the drive shafts. Aluminum is used for the differential cage and all needless metal removed. Very large ball bearings are used.

There are two universals with telescopic motion, and a stamped-steel torque stay is hung from a ball-and-socket carrier on the rear end of the gearbox.

As the rear spring suspension is of the platform type the drive is taken through the springs and the latter are attached above the axle, so as to flatten the springs and render them able properly to resist transverse leads, which are liable to produce side sway.

It hardly is necessary to give a detailed list of the numerous fittings, the tonneau lights, ventilators, upholstery, etc. Suffice it to say that it is a little better in completeness than the 1915 Packard equipment. Only this one type of chassis will be made, all other models being discontinued, but there will be a choice of a long or short wheelbase and twenty-two different body styles. Up to the present the price has not been fixed. The demonstrating cars are just coming out and the manufacturing experience gained in their making has to be checked up to see how it compares with previous years, but it is certain that the price will not be as much as might at first be expected.

IMPROVED STEWART PUMP

The Stewart-Warner Speedometer Corp., Chicago, has started production on a new type of single-cylinder, motor-driven, tire pump, which, while it retains many of the features of the model formerly made, has a number of distinct improvements. Perhaps the most important of these is the use of a piston using rings, instead of the plug type, or that without rings, employed in the former design. This piston, as shown herewith, uses one wide ring, and above it, five small rings formed as a unit in one groove.

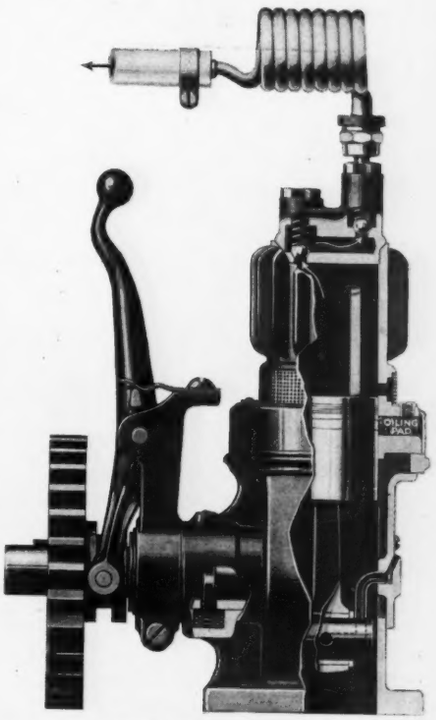
The flanged base for attachment now is larger and is drilled with four holes for attachment, instead of two.

The gear shifter arm, instead of being cast as part of the crankcase, now is a separate part tightened in place by means of a screw. The arm itself is of different shape. The use of a separate arm enables one to set it at whatever angle is needed for the particular installation.

The new pump has cast-iron crankcase, instead of aluminum, as used on the previous model, and another change of importance is the use of a brass air coil, shown herewith, which is connected to the outlet air valve. This coil is said to prevent air that is too warm from reaching the tires and it also prevents oil from passing into the tubes. There is no change in the price of the new Stewart, which is $15, including hose, gauge, etc.

PRICE OF FORD COUPE, $750

In an advertisement of the Ford Motor Co., appearing on page 88 of the April 29 issue of Motor Age, the price of the Ford coupe was given as $7.50. Obviously, the period was misplaced. The price of this model is $750.



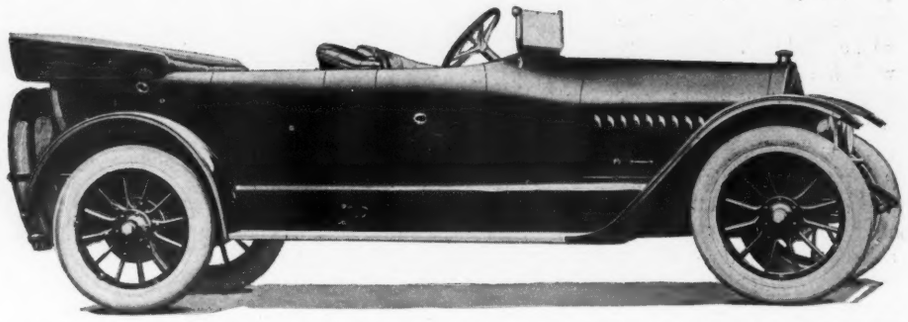
NEW STEWART PUMP

National $1,990 Twelve Roadmate to New Highway Six

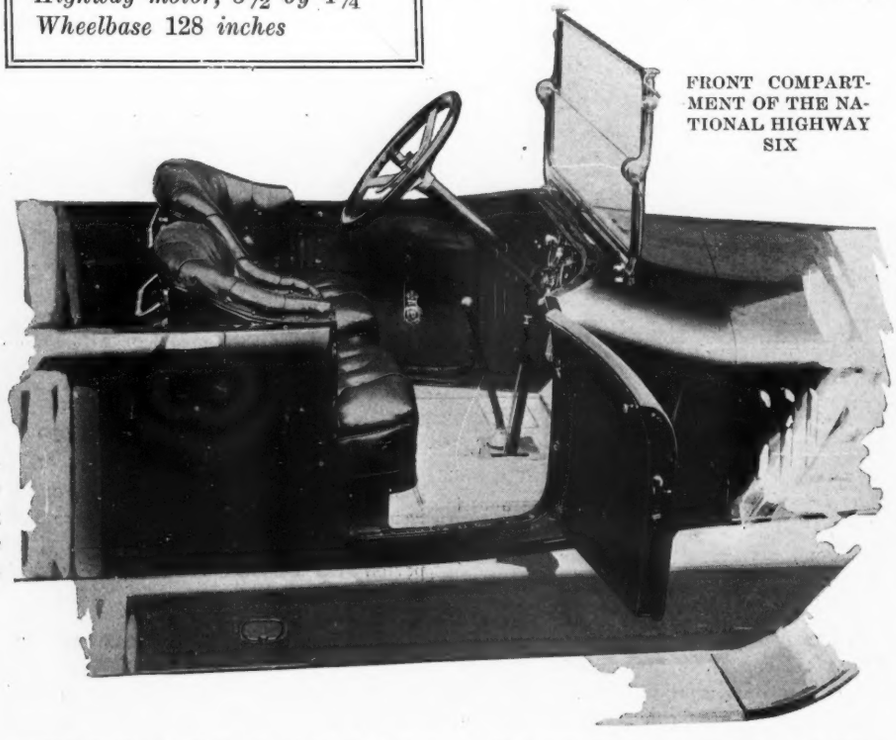
Former Has 2 3-4 by 4 3-4 V-Type Motor Made in Hoosier Plant

FEATURES OF THE 1916 NATIONALS

First touring under $2,000
New twelve not an experiment
Wheelbase is 128, *tires* 36 *by* 4½
Cylinders set at 60 *degrees*
Four or five-passenger body at $1,990
Highway six at $1,690
Tumble-in body design
Highway motor, 3½ *by* 4¼
Wheelbase 128 *inches*



SHOWING THE EXQUISITE BODY LINES ON THE NEW NATIONAL HIGHWAY SIX WHICH LISTS AT $1,690



FRONT COMPARTMENT OF THE NATIONAL HIGHWAY SIX

THE National Motor Vehicle Co. has a twelve-cylinder car as one of its new series models for the coming season. Nearly a year ago when the eight-cylinder motor first was announced as a stock production in this country, it was at once hinted that at least one concern would bring out twelve-cylinder designs for 1916. At first little attention was paid to these rumors but the present week has made good and the National is one of the first to announce a twelve as a stock model.

Made in National Factory

This new twelve will be manufactured entirely in the company's factory in Indianapolis and already has been on the roads for some time and shipments will begin in August. To date the motor has greatly exceeded the expectations of its designers in the matter of power generated and smoothness of running. It is much lighter, volume for volume, than the six design and is as accessible as a four or six.

This new National will sell at $1,990 as a four or five-passenger car and can be had at slight additional expense as a six or seven-passenger job. It is made with 128-inch wheelbase and carries 36 by 4½-inch tires.

Displacement Compared With a Six

The motor has 2¾ by 4¾ cylinders, giving a piston displacement of 339 cubic inches. The motor is a V design, six cylinders at one side and six at the other side, being thus mounted in two groups at an angle of 60 degrees, as compared with a 90-degree angle used in eight-cylinder V-type motors. This results in a narrower overall design. Compared with a six-cylinder power plant of approximately the same overall dimensions this new twelve has 12 per cent more piston displacement and weighs considerably less, a fact which goes to prove the argument that in twelve cylinder motors it is possible to increase the number of cylinders and yet reduce the weight of the motor.

The motor is equipped with a Westinghouse starting and lighting system; and some chassis characteristics include three-speed gearset, cantilever rear springs, floating axle, and a steering gear which permits of turning the car in a 33-foot circle. The body is an accentuated streamline design and the radiator, a National, with some modification in curves.

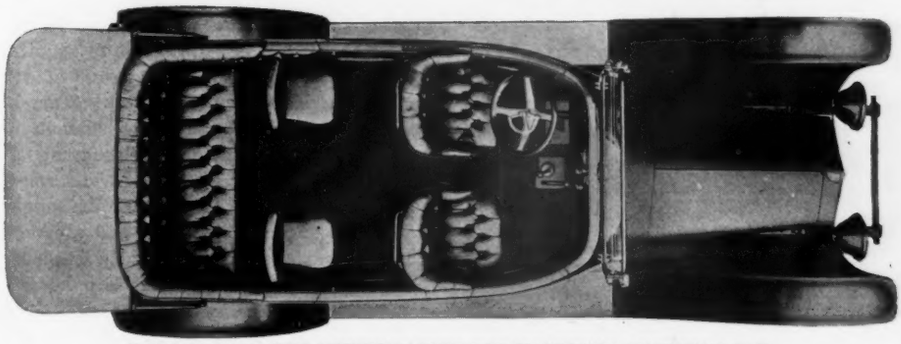
This new twelve is not a drafting-room creation but has been running for some time and has been well tested out on the block as well as in the chassis. A few details of design have not been finally completed, which prevents the reproduction of photographs in this description.

Highway Six Is New

But the twelve is not the only new National model for next year. There is a new six, the Highway six, at $1,690, which is a lower price than National cars ever have been marketed at heretofore; in fact, it is the first time a National touring car has been listed below $2,000. This new Highway six carries out practically all of the ideas of design set forth in the six which the company featured during the present year and which will be continued next season in practically the same form at $2,375.

The Highway six, however, incorporates some features new in National design and in general is a long, low and roomy vehicle accommodating four or five passengers and two additional tonneau seats converting it into a six or seven-passenger car.

Exteriorally the new Highway six is attractive. The body is what is known as the tumble-in design, that in which the top sides curve inwards, giving a convex effect. Viewed from front to rear the body lines are boat type with the widest part in rear of the front seat. The seats are placed low, that for the driver adjustable, so that it can be moved forward or backward on two slides, with a couple of thumb screws to hold it in the desired position. The auxiliary tonneau seat immediately in rear of the driver also is mounted so as to be correspondingly adjusted fore or aft, according to the posi-



TOP VIEW OF THE SEVEN-PASSENGER NATIONAL HIGHWAY SIX

tion of the front seat. The front seats are individual types with a passageway between them.

The motor, a block design with valves on one side, has cylinders 3½ by 5¼, giving a total piston displacement of 303.1 cubic inches and an S. A. E. horsepower rating of 29.4. The motor is claimed to develop 48 horsepower. In design it is a smaller edition of the larger six of this season but differs in one respect, namely, in that a Stewart vacuum-gravity gasoline feed system is used, this being the only National model on which it is used for next season and marking the first use of it by this company. With it, a side inlet carbureter is used and the gasoline tank is located under the body at the rear, being so placed that the rear of the body is practically in the same vertical plane as the rear edge of the tank, resulting in very little overhang of body or other parts back of the rear axle.

Weight Reduction Considered

All through the reduction of weight has been one of the primary objectives and it has been accomplished by a general cutting out of useless weight, this pruning process not being local to any particular points but general throughout. By this process over 600 pounds has been eliminated as compared with the weight were the conventional practices of the present season followed out, bringing the total weight to 3,000 pounds.

Throughout there has been a careful selection of materials, alloy steels playing a very general part in the car makeup. All gears in the gearset and rear axle are chrome-nickel alloys with the possible exception of the rear axle pinion, which is of nickel steel. All shafts in gearset and axle are of chrome-nickel. The front axle is a nickel steel forging and the frame a high-carbon steel product.

The body is hung approximately 1½ inches lower than is common with such designs, this being partly accomplished by heavily dropping the front axle between the steering knuckle and the spring seats. By heavily bottle-necking the frame in front it is possible to run the car in a 33-foot circle.

Returning to a more detail consideration of the motor. For the first time it is noticed that the National company has mounted the electric generator and magneto on the same side. The usual National four-point motor suspension is used which obtains a flexibility to avoid twisting from the frame due to one bolt attaching each motor arm to the supporting bracket, these four bolts lying fore and aft and acting as swivels. This method of support has been used by the company for 5 years. Cast iron valves are used having a diameter of $1\frac{9}{16}$ inches in the clear and with a lift of ⅜ inch. The single camshaft is gear driven; a high-tension magneto giving a single ignition system is used and Westinghouse starting and lighting system is fitted.

Tubular Propeller Shaft Used

The three-speed gearset is a unit design with the motor and from it power is transmitted through a tubular propeller shaft with a universal at each end. The rear axle is a floating design with spiral-bevel drive and tapered roller bearings used throughout. Spring suspension includes a set of semi-ellipties in front with the National design of flat cantilever in rear, the cantilever taking the driving effect of the rear axle and transmitting it to the frame. A torque tube is employed.

Features of Equipment

Service brakes are contracting types operating on 14 by 2-inch drums, and emergencies are expanding designs. The wheelbase measures 128 inches; tires are 34 by 4½ all around, and equipment is complete including one-man top, Jiffy curtains, windshield, speedometer, electric horn, power tire pump, ammeter, gasoline gauge and the usual tool equipment which is carried in a special compartment in front at the driver's left. The adjustable steering column is on the left with change speed and brake levers in the center.

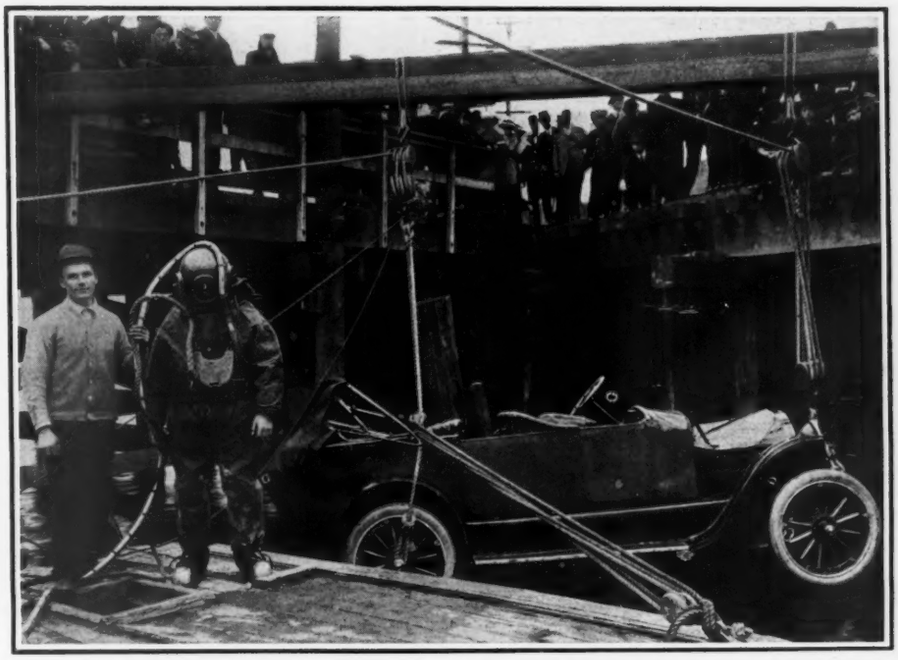
NEW ELECTROMOBILE MAKER

St. Louis, Mo., May 22—Electromobile industrial trucks, heretofore manufactured and sold by the Electromobile Co., St. Louis, hereafter will be made and sold by the Orenstein-Arthur Koppel Co., Koppel, Pa., with branches in New York, Chicago, Pittsburgh and San Francisco. The Electromobile Co. will remain selling agent for the southwest.

TAKES OVER MITCHELL AGENCY

New York, May 22—Special telegram—The Carl H. Page Motor Co. has been formed to take over the Mitchell agency in the metropolitan district, formerly held by Harry H. Houpt, Inc. The latter company will take the Hudson agency in this district, which has been handled by the A. Elliott Ranney Co.

Deep Sea Diver Saves Car from Watery Grave



With the aid of a driver, a crew of men and block and tackle, a five-passenger Pullman Junior car was rescued from the waters of Lake Union, in Seattle, into which it leaped when its owner became excited and sent it crashing through the railing of a bridge. In its wild ride, the car snapped a two-and-a-half-inch water pipe and tore down fifteen feet of railing and leaped fifteen feet out into the water. After it was located a diver was sent down to attach ropes to the machine, and it was raised to the surface, much to the amusement of a big crowd of spectators. The car was not seriously damaged.

FOUR-CYLINDER OLDSMOBILE ROADSTER

Oldsmobile Eight and Four for 1916

Former at $1,295—Sixes Discontinued

FOR the 1916 season the Olds Motor Works, Lansing, Mich., has dropped entirely its six-cylinder model 55, and is to market an eight-cylinder design at $1,295 in addition to continuing its four-cylinder car at a material reduction, from $1,285 to $1,095, and with a number of chassis improvements along with a larger body and longer wheelbase.

The news of the Olds factory getting into the eight-cylinder field comes as a surprise, for it was thought that only the four-cylinder type would be built this season. No specific details of the new eight are given out at this time, but it will have much the same general appearance as the four, and wherever possible to be consistent with the greater power, it will conform to the construction of the four. This standardization makes a better manufacturing proposition with the result that price could be brought down to the level above mentioned.

HIGH SPOTS IN 1916 *OLDS LINE*

Four reduced from $1,285 *to* $1,095
Wheelbase 120 *instead of* 112
Body is larger
Propeller shaft now open
Frame redesigned
New rear axle
Other minor changes

Deliveries on Eight in August

Deliveries on the eight are expected to begin in August, though with the factory working to capacity on the fours at this time, the outsider is impressed with the fact that the Olds plant is none too large for the contemplated two-car schedule. It is stated that within a short time the full details of the new eight will have been decided upon, and the public may look for an announcement of it some time before deliveries begin.

The four-cylinder Oldsmobile, which for the 1916 season is designated as model 43, follows the same general lines as its predecessor. The characteristic radiator of German silver, the cowl shape, and the design of the body with its wide panel running along the top still distinguish the Olds cars from other makes.

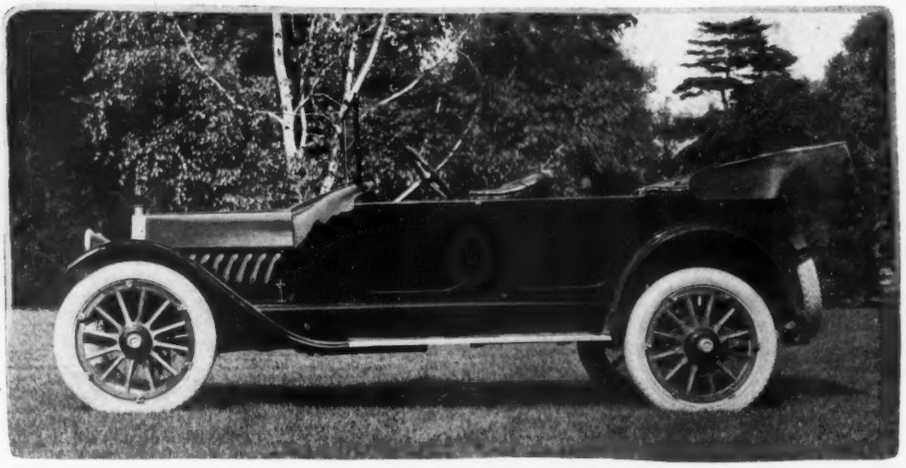
No change whatever has been made in the overhead-valve engine, but the chassis is lengthened from a wheelbase of 112 to 120 inches, giving more room for the body, which has been widened and lengthened. In the drive system, the inclosing of the propeller shaft with a torsion tube has been done away with and the open type of shaft now is employed. There is also a change in the frame, which though equally as strong as before, is redesigned to require one less cross member. The result of all this chassis alteration is to make a much lighter construction, and along with it, a new rear axle is fitted, this having a pressed-steel housing instead of the former malleable iron and tubing type. Although the car is considerably larger and roomier than the previous model, it really is about the same in weight, due to the clipping of so much from the chassis and axle.

Stewart Vacuum Feed Adopted

The main specifications of the model 43 include a 3½ by 5 motor with Delco combination electrical unit, Marvel carbureter, centrifugal pump cooling and splash oiling of the engine; three-speed gearset in unit, left drive and center control, and 33 by 4 straight side non-skid tires, front and rear, on demountable rims. A new feature this year is the fitting of the Stewart vacuum fuel feed.

In the axle alone 48 pounds is saved by the pressed steel construction and the new design. The former axle had a malleable housing for the differential with tubing ends to house the drive shafts. The new type is a one-bearing, three-quarter floating construction with the entire housing of pressed steel in two halves welded together. A web at top and bottom serves as a reinforcing element. In this construction, the new axle incorporates the popular spiral-bevel gears instead of the formerly used straight bevel type, and the whole differential unit is mounted on a carrier to allow its removal without disturbing the axle proper.

The new type of drive, wherein an open tubular shaft is used, is in accord with latest American practice, and is a lighter construction than that in which a torsion tube surrounds the propeller shaft to take drive and torque. This new design, which is known as the Hotchkiss drive, provides for drive and torque to be taken through the rear springs with a cushioning effect, preventing jars and shocks being transmitted to the frame. To do this, the master leaf of each rear spring is made stronger, and their front brackets are in-



FOUR-CYLINDER OLDSMOBILE TOURING CAR WHICH HAS A 120-INCH WHEELBASE INSTEAD OF 112

creased in size. The rear spring front bolt is made ¾ inch in diameter as compared with a ⅝-inch bolt with the old form of drive. The drive shaft formerly used was a solid section, and though the hollow shaft is lighter, it is also stronger and prevents whipping to any extent.

In redesigning the frame, a slightly thicker stock is used. This is $\frac{5}{32}$-inch material as compared with the ⅛-inch metal used in the old frame. The channel has also been deepened from 4 inches to 4⅜ inches, adding greatly to the rigidity. This new frame makes it possible to do without the cross member formerly placed just back of the motor. In the final analysis, therefore, the new frame, though much stronger than the old, represents a difference in weight of only a few pounds.

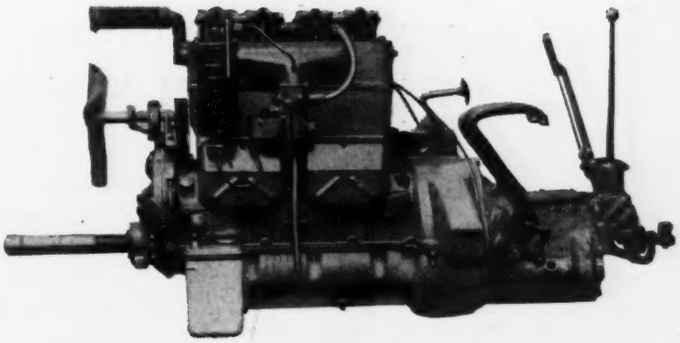
Springs Have Been Redesigned

The spring suspension has come in for some of the development also. Both front and rear sets are mounted so as to be nearly flat under normal load. That is, the bow or camber usually found in springs is nearly lost sight of in these new springs. The idea is to cause easier riding along with better results on the springs. The usual spring bows upward enough, so that when depressed it rarely becomes flat. If the spring is about flat in the first place, depression bends it slightly to the opposite side of the horizontal, and the action therefore is uniform on both sides of the horizontal with the result of more equal strain.

In order to flatten the front springs, they are made 36 inches long, or 1 inch longer than last year, and the front of the frame is bent down in front to put the point of attachment nearly in line with the spring pad on the axle. For the rear set, the front hanger is designed to go down lower than it did, and the quarter-elliptic part also bends down farther. These rear springs go under the axle. Perfection springs are used this year, and the leaves have diamond ends instead of round shapes.

In redesigning the body for more length and width, the Olds engineers have produced an exceptionally roomy driving compartment. The front seat width has been increased 3 inches, and the leg room also is 3 inches more. Referring to the touring car, these increases give a length of 41 inches from the inside of the seat back to the clutch pedal. The tonneau measures 47⅝ inches from the back of rear to back of front seat, giving 3 inches more leg room. The width of the back seat has also been increased 3 inches. Doors are 23 inches wide—1 inch more than they were, and their height has been augmented by 1 inch also. Along with the making of the body sides higher, the hood has been lengthened 2½ inches so that it will conform with the general body increases, and to preserve harmony of lines.

The motor has a displacement of 192.4 cubic inches, and will deliver about 30 horsepower maximum on the block, it is said. The cylinders are a block casting



FOUR - CYLINDER POWER PLANT IN 1916 OLDSMOBILE

with the gearset and clutch in unit, and arranged for three-point mounting in the frame. The most uncommon point about the engine is the overhead valve construction. Though this is not uncommon in itself, the method of completely inclosing the valve rockers, push rods and springs is unusual. In fact, the push rods run up to the rockers through a cast passage in unit with the cylinder casting. When the aluminum top plate is in place over the valve mechanism, the motor presents an exceeding clean appearance, and on casual inspection might easily be mistaken for an L-head design.

Cylinder Head Detachable

The cylinder head is detachable, and it carries the entire valve mechanism together with the intake manifold. Distribution of the gases from this manifold is effected within the head casting, while on the opposite side are the four openings to the exhaust header, which is a separate piece.

The Delco unit and the centrifugal water pump are on the right side on the same shaft which is driven through gear connection with the crankshaft at the front. The opposite side is taken up by the carbureter and the Stewart vacuum fuel tank, with the pressed-steel cover plates over the openings to the valve tappets left readily accessible. On the front of the same side is the oil reservoir which is a part of the lower half of the crankcase.

Both crankshaft and camshaft have three bearings, mounted in the upper part of the crankcase, which is integral with the cylinders. The crankshaft has a substantial flange to which the 14-inch flywheel bolts, and the front gears are spirally cut to get rid of noise. Drive for the propeller type of fan is by a flat belt from a pulley on the pump shaft.

The Delco apparatus is the standard single-unit type with the ignition distributer a part of the motor-generator. The electric system operates on 6 volts, and the storage battery is carried in a metal box under the front seat.

Lubrication is by splash, with a pump to force oil up to a dash gauge, from which point it runs by gravity to the individual troughs under the cylinders and to the crankshaft and camshaft bearings.

Now that the vacuum fed system is employed, the pressure air pump of last year is eliminated. The fuel is drawn to the vacuum tank instead of being forced to the carbureter, and from the tank flows by gravity to the carbureter.

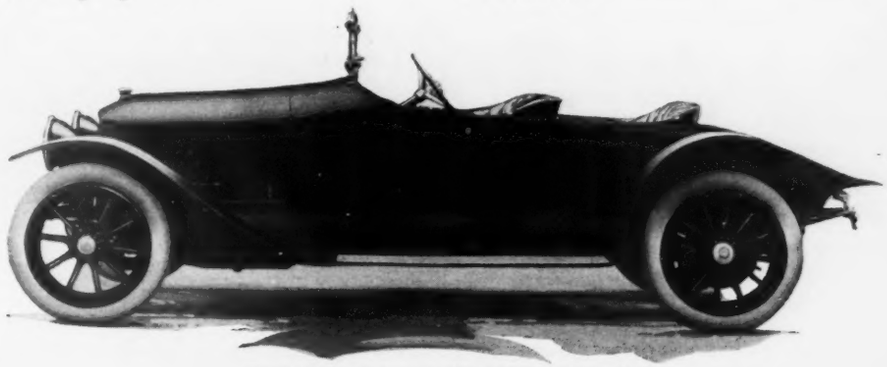
New Speedometer Drive

The speedometer drive has been changed so that it is now off the propeller shaft instead of the front wheel. The driving gear is mounted on the front of the forward universal, and a bracket attaching to the rear of the gearbox holds the flexible shaft gear.

The same general refinement of appointments and finish which featured the car of last season are to be found on the new model. The circassian walnut instrument board with its small compartments on either side, and the steering wheel of the same wood do their part to touch off the leather upholstery and general finish.

NEW PREMIER ROADSTER

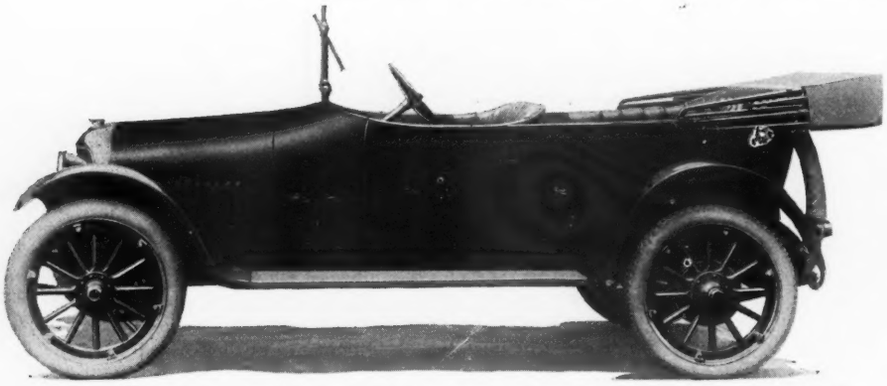
The Premier Motor Mfg. Co., Indianapolis, Ind., announces a new type of three-passenger roadster called the Clover-leaf from the marked resemblance of its seating arrangement to a leaf of that variety. There is an aisle between the two front seats through which one may pass back to the rear seat.



NEW CLOVER-LEAF PREMIER ROADSTER

Price Lower and Improvements Made in 1916 Oakland

All Four-Cylinder Models Now $1,050—Bodies Are Larger



OAKLAND FOUR-CYLINDER TOURING CAR, MODEL 38, WHICH LISTS at $1,050

FEATURES OF THE 1916 *OAKLAND*

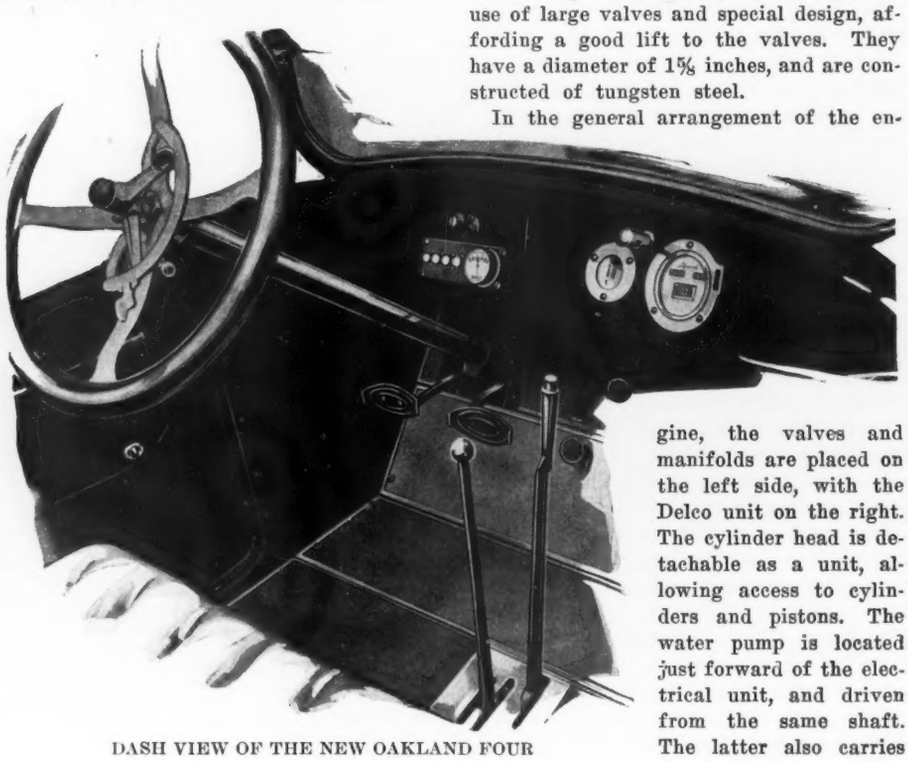
Touring, roadster, speedster—$1,050
Bodies improved and made roomier
Mechanical changes are few
New type of carbureter
Clutch engaging springs changed
Northway power plant retained unchanged

VERY little change has been made in the Oakland four-cylinder model of 1916 over that of 1915. Several slight mechanical improvements, an increase in the size of the body and a material reduction in price to $1,050 for all three types—touring car, roadster and speedster—are the conspicuous points about the new model 38. Its general appearance and its features of design are the same as the model 37 which it supersedes. The old prices were $1,200 for the touring car and $1,150 for the roadster, so that in one case the reduction is about $200, and in the other, $150.

The outstanding feature of the new models over those of last year is the greater height of the cowl, hood and radiator, lending just a suggestion of more power and more size to the cars. Along with this the driving compartment has been enlarged by 2 inches in width and the same amount in length.

Improved Carbureter Used

The Oakland four has a Northway unit power plant, with a 3½ by 5 motor. The Delco electrical combination is continued, and the carbureter is an improved Marvel. The clutch is a cone type, gearset a compact three-speed design, and drive to the rear through a tubular shaft. Springs in the rear are three-quarter elliptic, the axle is floating and the propulsion of the chassis on the Hotchkiss principle. The wheelbase is left at 112 inches, and the car is shod with 33 by 4 tires, two non-skid.



DASH VIEW OF THE NEW OAKLAND FOUR

Nothing has been materially altered in the engine design. It is really so very similar to that of last year that the casual observer would not see any difference. However, the whole power plant has been made more compact by reduction in the space occupied by the clutch, and this allows a shortening of about 2 inches overall. Instead of using one large spring at the center of the clutch mechanism to hold it in engagement with the female member, six small springs are employed for the purpose, these being arranged equidistant from one another. This permits each spring to be shorter than a single large spring would have to be and at the same time it should tend to a better action, since the engaging force is distributed.

The type of Marvel carbureter now fitted employs a dashpot to prevent fluttering of the air valve. That is, the valve is connected to the dashpot in such a manner that its action is dampened, and any slight change in the suction will not materially affect the opening. The change has to be of sufficient duration to make the valve open gradually. The carbureter is fed from a Stewart vacuum tank.

Motor Shows 2,500 r. p. m.

The motor is capable of running at moderately high speed, and may be classed as a high-speed type in the generally-accepted sense of the term. It attains a speed of 2,500 r. p. m. when developing 39.5 horsepower. This is commendable output for an engine of its dimensions, and is said to be made possible principally through the use of large valves and special design, affording a good lift to the valves. They have a diameter of 1⅝ inches, and are constructed of tungsten steel.

In the general arrangement of the engine, the valves and manifolds are placed on the left side, with the Delco unit on the right. The cylinder head is detachable as a unit, allowing access to cylinders and pistons. The water pump is located just forward of the electrical unit, and driven from the same shaft. The latter also carries the fan driving pulley, and is operated by gear connection with the crankshaft in the conventional manner. Suspension is at three points with integral crankcase arms at the rear, and a center support at the front. The oil reservoir is at the forward left side and a part of the lower half of the crankcase.

Pistons Are Crowned

Pistons are crowned to make them as strong as possible without materially adding to their weight. They connect to the crankshaft through the conventional type of drop-forged connecting-rods. The crankshaft is a three-bearing type.

The Delco apparatus is the standard single-unit type and incorporates the ignition distributer. There is no alteration in its method of operation. When acting as a generator it is driven from the front gears by the shaft already mentioned, and when cranking the engine it drives the flywheel through a train of gears housed in an in-

tegral compartment on the right rear side of the flywheel case. A small pedal to the right of the control pedals is used to push the gear train into mesh with the flywheel ring gear, and through this connection a reduction of about 25 to 1 is attained. That is, the engine is turned at a speed one twenty-fifth that of the starting motor. The starter gears are so arranged that both sets are shifted out of mesh when the starting function is not required, causing all of them to be at rest until needed.

Automatic Spark Control

The electrical system is of the single-wire type and operates at 6 volts. Ignition provides an automatic spark advance within range of the set point of the manual spark lever on the steering wheel quadrant. This automatic advance is attained through the use of a centrifugal governor which controls the spark position in accordance with the speed within the limits as just mentioned.

The charging rate of the generator also is automatically taken care of. This takes care of charging at low speeds, so that, with ordinary car speeds of from 10 to 15 miles an hour, the battery is being charged at about the same rate as it would were the car running at high speed. A compartment under the front seat conveniently houses the 80-ampere-hour Exide storage battery.

The gearset still is the compactly-designed unit as used on the previous model. The shifting lever mounting and that of the emergency brake lever continue to be of the unique rocker type which require no oiling, and are proof against rusting or binding. The brake operating system also uses these rocker bearings. Each lever and the brake rocker shaft get their oscillatory freedom through the compressibility of the springs which hold them to their positions. Small pressed-steel cups hold the springs in place, and these can be removed by turning them at right angles to their fastened position, so that the larger pair of slots in their heads will clear the ends of the brake rod levers or the pins in the ends of the shifting or emergency brake levers, as the case may be. Another clever part of these bearings is the provision for adustment of the rod connecting the brake lever to the brake rocker shaft. The threaded end of the rod passes through the end of the lever, the front side of the part around the hole through it being grooved out to receive the edge of a wedge-shaped piece screwed onto the rod end. A cotter pin prevents it from coming off, and the lever groove acts as a lock to prevent turning. Thus the lever and its rod are free to oscillate sufficiently for all positions of each with respect to the other.

The propeller shaft is tubular and fitted with two universals in the customary positions.

Oakland was a pioneer in the underslinging of the springs, and this new model is no exception. The rear set go under the axle, while the front pair remain above. This rear construction lowers the chassis considerably and is in part responsible for the general low lines of the car.

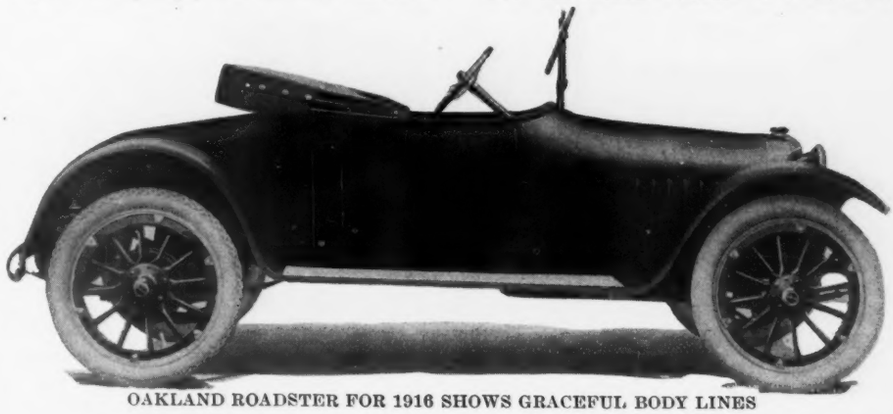
The rear axle is of the type known as a one-bearing floating construction. That is, there is a single bearing in the center of each wheel to carry the load. These wheel bearings are Hyatts, as are those in the differential. New Departures are used in the pinion and as thrust carriers on either side of the Hyatts.

Frame is Tapered

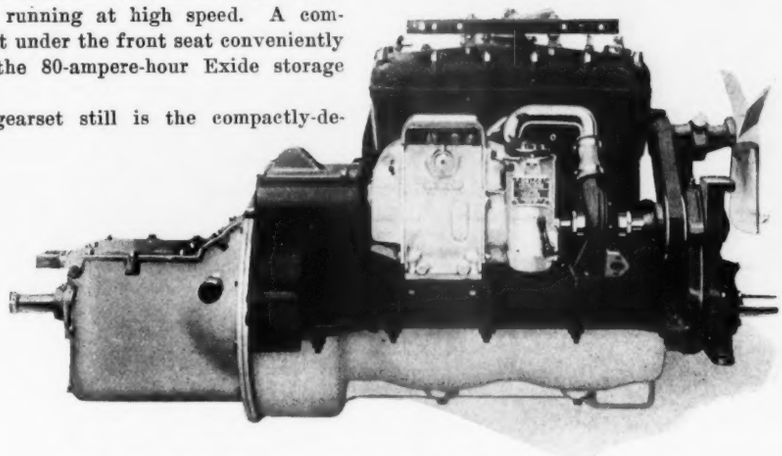
A commendable feature of the chassis is the tapered frame which follows the body line all along, offering good support throughout the body length and doing away with running board aprons, since the frame itself comes flush with the body and running boards. Some weight is also saved by the elimination of these aprons. This construction was new to the Oakland four of last year, and is continued without change.

In connection with the body, a neat feature this year is the combining of the instrument board with the body. It is made of metal and is so tilted that a clear view of all instruments is possible when in the seat. The running boards are covered with linoleum this year, the previous model having metal boards. This was done to follow the popular trend.

For this season Oakland is to make a feature of the attractive speedster type of body with its bucket seats and rakish appearance. The sides of the body are low and the afterdeck flat to carry a spare tire.



OAKLAND ROADSTER FOR 1916 SHOWS GRACEFUL BODY LINES



NORTHWAY UNIT POWER PLANT OF THE OAKLAND FOUR

PROFITS FROM WRECKED JITNEY

Kansas City, Mo., May 21—The Kansas City Auto Wrecking Co. profits by the jitney service. It has bought many old cars that jitney work has put to the bad. Cars that before being worn to pieces or wrecked were worth $500 to $750 are bought by this firm at $50 to $200. No repairs are made; the parts are segregated and sold separately to repair shops, manufacturers, and individual owners of cars.

The cars offered to the company are in every state of wreckage, from a mere damaged engine to almost entire demolition, in which only a few of the small parts are available for sale. One of the first cars bought as a result of a jitney wreck was a Kansas City motor car machine, made in Kansas City 10 or 12 years ago by a company not now in business. Flanders, Fords, indeed many different makes of motor cars are brought here.

CROOKS ANNEX JITNEY RECEIPTS

Rock Island, Ill., May 21—Besides many other difficulties, jitney bus drivers here are experiencing a new woe. Crooks have discovered that drivers are a fruitful class on which to ply their trade. During the last few weeks such robberies have been numerous. Watching their opportunity when the streets are deserted, the robbers hail the driver, who stops, expecting to pick up one or two passengers. Instead, he is confronted with a revolver and forced to disgorge his day's receipts. The police have been unable to locate the highwaymen.

Dixie Highway Route Determined at Heated Meeting

Rival Factions Finally Compromise Several Disputed Points and Optional Roads are Listed by Commission

CHATTANOOGA, Tenn., May 26—Fifty years ago the north and the south, embittered and embattled, were striving to utmost endurance for each other's undoing. The war between the states was the greatest movement which had absorbed the interest and activities of the two sections.

Today there is another movement which has aroused the two sections to an intensity of enthusiasm and activity hardly less great than that of half a century ago. But today, that power and energy is being directed toward the mutual benefit and closer relationship of the two sections instead of destruction and estrangement.

Definite Route is Selected

This tremendous moving force is the Dixie highway, the route for which was fixed by the Dixie highway commissioners here last Saturday, running from Chicago, down through seven states, to Miami, Fla. After the bitterest contests by different sections competing for the privilege of having the highway, the commissioners agreed upon two routes—an east route and a west route—which shall meet at the principal points of the general direction of the highway, as follows:

Chicago to Harvey, crossing the Lincoln highway, to Momence, Watseka, Hoopeston, and Danville, all in Illinois, thence to Covington, Ind., Crawfordsville to Indianapolis, and south from Indianapolis by two routes, as follows:

East route—Indianapolis, Cincinnati, Covington, Ky.; Georgetown, Lexington, Richmond, London, Corbin, Barbourville, Pineville, Middlesboro, all in Kentucky; thence to Tazewell, Tenn., Knoxville, Rockwood and Chattanooga.

West route—Indianapolis to Bloomington, Paoli and New Albany, all in Indiana; thence to Louisville, Ky., Elizabethtown, Mammoth Cave, Bowling Green, all in Kentucky; thence to Springfield, Tenn., Nashville, Murfreesboro, Shelbyville, Mont Eagle, Chattanooga. The east-and-west routes, having joined at Chattanooga, again take east and west courses as follows in Georgia:

East route—Chattanooga, Dalton, Calhoun and Kingston.

West route—Chattanooga, Lafayette, Summerville, Rome and Kingston.

From Kingston the route is single, via Cartersville and Marietta to Atlanta. From Atlanta the route again takes east and west courses, as follows:

East route—Atlanta, McDonough, Jackson and Forsyth.

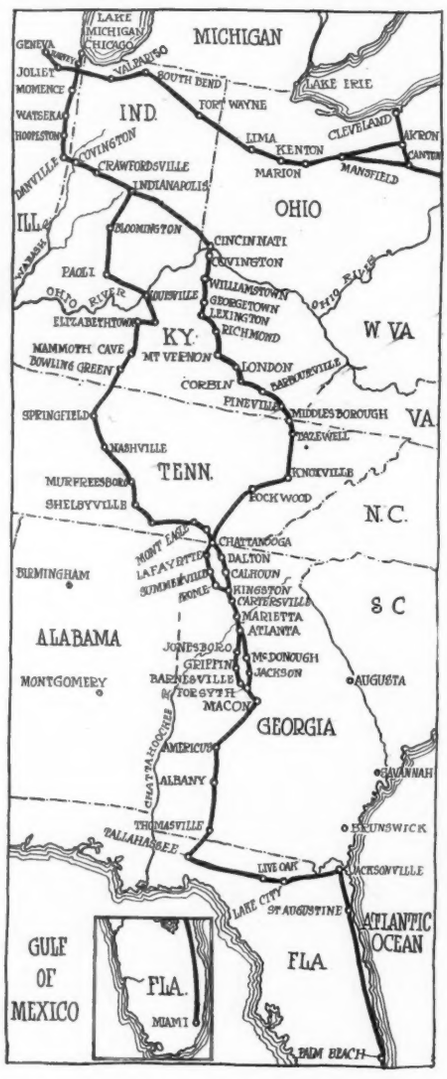
West route—Atlanta, Jonesboro, Griffin, Barnesville and Forsyth.

A single route is selected south from Forsyth, as follows:

To Macon, Americus, Albany, Thomasville, all in Georgia; thence to Tallahassee, Fla., Live Oak, Lake City, Jacksonville, St. Augustine, Ft. Pierce, Palm Beach to Miami.

Besides these routes, it was proposed at the meeting, by Carl Fisher, one of the commissioners from Indiana, to form connecting links with the eastern and western routes of the northern end, making two highways leading northward, one along the eastern shore and one along the western shore of Lake Michigan. His plan would extend the road from Chicago to South Bend, Ind., thence north to Mackinaw, thence south, via Bay City, to Detroit.

The petition of Michigan to be allowed a share in the highway was granted by the commissioners, and Michigan pledges herself to provide a "lake loop" and to extend the east route from Dayton, Ohio, north through Toledo to Detroit, thus making a great loop of the northern end of the highway.



MAP SHOWING ROUTE SELECTED FOR DIXIE HIGHWAY

A similar loop is proposed for the southern end of the highway, which is to be brought about by the selection of an eastern route through Georgia, south of Macon to Jacksonville, and a west route through Florida, south from Tallahassee, making a complete circuit of the east and west coasts of Florida.

It is required that all links of the highway shall be completed within 1 year and that the highway shall be dedicated about next Thanksgiving. In the meantime the commission retains the right to eliminate from the route any city or county which fails to live up to its promises in building the highway.

The commission perfected its organization, adopted a charter and also adopted plans for the construction of the highway. The organization of the commission now consists of twenty-one members, fourteen directors, two each from the states through which the highway will pass, and the original seven incorporators of the Dixie Highway Association.

A resolution also adopted at the meeting, upon motion of Commissioner George W. Harris, of Cincinnati, for the encouragement of branch highways.

The following officers of the Dixie Highway Association were elected:

President—C. E. James, Chattanooga.

Vice-Presidents—Tennessee, M. M. Allison; Ohio, H. L. Gordon; Indiana, Thomas Taggart; Georgia, W. T. Anderson; Florida, G. W. Saxon; Kentucky, H. B. Hanger; Illinois, Richard J. Finnegan.

Secretary-Treasurer—W. R. Long, Chattanooga.

Executive Committee—The president and secretary and Carl G. Fisher, Indianapolis; Richard Hardy, Chattanooga; Clark Howell, Atlanta.

Circle Routes Endorsed

Clark Howell, of Atlanta, chairman of the commission which selected the highway, gave out the following statement after the adjournment:

"The commission adopted the circle arrangement largely upon the suggestion of Carl Fisher, of Indianapolis, who originally suggested the Dixie highway movement. It was done largely to meet the condition created in the applications of Louisville and Nashville on the one side, and Cincinnati and Knoxville on the other. Both were enthusiastic, and as their interests in no wise conflicted, it was the unanimous judgment of the commission that it was best to take advantage of this opportunity to get two great routes centering at Chattanooga. The Knoxville-Cincinnati route would traverse Ohio and connect with western New York and western Pennsylvania. The Nashville-Louisville road would reach direct to Chicago, and appeal to the demand for connection from Indiana, Michigan, Illinois and the middle west.

"This circle arrangement, in due time, will take in the Florida peninsula just as has been provided for in the Michigan peninsula."

There were in attendance at the conference about 5,000 road enthusiasts from all along the route, and the contests in the various sections were heated in many instances. Chambers of commerce, boards of trade and motor clubs of the middle west fought tooth and nail for the route. Through Tennessee and Kentucky the ri-

valry was characterized by the picturesque bitterness of political and sectional feuds which in years agone, have characterized these states. In Georgia and Florida the farmers have set the woods afire to beat each other building roads.

Some idea of the keenness of the rivalry may be gathered when it is stated that more than sixty different routes were offered to the commissioners, many of these carrying with them promises of the construction of tributary highways.

The tremendous enthusiasm of localities is shown by the action of Rome, Ga., in taking a delegation of 1,000 people and a trained chorus of women to create enthusiasm, while Dalton, Ga., which was Rome's principal rival, had the mayor declare the first day of the conference a legal holiday and the entire town closed up business and went to Chattanooga in a body.

This enthusiasm has not died and will not die until the highway is a reality. Many losers in the fight have declared their intention of building their proposed links anyway, since they can offer short cuts and many points of interest to tourists.

SPAIN WANTS AMERICAN TIRES

Washington, D. C., May 25—An opening for American motor car tires in Spain is suggested in consular reports. American manufacturers are advised to make arrangements to quote prices, c. i. f. Seville, should they seek the Spanish trade and establishing branch offices in Spain, preferably at Barcelona. If branch offices are not established, it is suggested, the naming of a general agent, to whom terms of 30 or 90 days, or even longer, can be quoted, might be advisable, the European firms taking such action.

HALF MILLION FOR ROADS

Pittsburgh, Pa., May 24—Allegheny county will spend more than $500,000 in roads building and improvement this summer. The grand jury recently approved numerous projects which will not be advertised until May 29, after which contracts will be awarded. The jobs and estimated costs follow: Bethel road extension, 3.92 miles, cost $92,181.70; Brownsville extension road, 5.74 miles, $106,190; Hope Hollow road, .82 mile, $20,300.60; New Town and Rodi road in Wilkins and Penn townships, 4½ miles, cost $133,711.60; McCoy road extension, 1¼ miles, cost $31,330.35; Round hill road, 2.37 miles, cost $48,493.53; Noblestown road, 500 feet, $2,407; Braddock and Ardmore connecting road, 1,678 feet, cost $9,687.50; Sankey road, 528 feet, cost $2,676.

VENEZUELA BUYS U. S. CARS

Caracas, Venezuela, May 20—Sales of American motor cars in Venezuela have increased materially since the outbreak of the European war, despite unfavorable economic conditions due to prompt reduction of all government salaries and the paucity of markets for exports. More than 90 per cent of the cars imported come through the port of La Guaira. From July, 1914, to March, 1915, inclusive, only four European cars were imported, as compared with ninety-seven new Americans cars.

MAY QUIZ GASOLINE COMPANIES

Oklahoma City, Okla., May 21—The lack of anything like uniformity in gasoline prices in Texas and Oklahoma may bring about a joint investigation of the refined oil trade of the two states by their attorneys-general.

It is alleged that the refining companies arbitrarily fix the prices of gasoline without regard to the conditions surrounding the industry. It is pointed out in support of this contention that the fuel may be selling for 10 or 12 cents per gallon in Austin, Tex., and on the same day the price is perhaps 14 to 16 cents per gallon in some other town of the state which takes the same freight rate.

Recently citizens of Poteau, Okla., filed complaint before the corporation commission of this state against the Pierce Oil Corp., the Gay Oil Co., the Texas Co. and the Magnolia Petroleum Co., alleging that the price charged in that town for gasoline is excessive, as compared with many other places in Oklahoma. The complainants point out that the retail price of gasoline is 16 cents per gallon. The case is set for hearing June 8.

1916 Locomobile Makes Early Debut

Several Refinements Noted in New Models

NEW YORK, May 24—The 1916 Locomobiles have just arrived at a number of the branches and show a considerable number of refinements over the 1915 models. The principal change is in the clutch which is a multiple-disk design so constructed as to require practically no attention as regards lubrication and adjustment. It is a dry disk design with nine driving and eight driven disks. Between these there are eighteen disks faced with fabric which are idle on the clutch shaft. The effect of these is to distribute the wear over a large surface area and to give a very easy-engaging clutch. In addition to this refinement, it will be noted that the cars have a longer and lower appearance due to an increase in the wheelbase, the straightening out of the body lines and the method of attaching the body to brackets on the frame instead of to the frame itself.

By increasing the slope of the bonnet the line of demarcation between the bonnet and the cowl has been entirely removed and the bonnet line moulds gradually into the side line of the body without any perceptible break. The instrument board has been laid out in a different manner, providing greater accessibility to the switches, thereby enabling the driver to operate them with his foot. The upholstery has also been made the subject of improvement and now is equipped with differential springs which gradually absorb the shock by having a stiff spring take up the effort where a weaker spring has reached its capacity. Other points for which the new models will be noted is in the increased use of drop forging for such points as the distance rods, etc. The result is to produce a lighter car, although more room has been gained by the longer wheelbase. The increased available space has been made use of to mount a seven-passenger body on the smaller of the two sixes manufactured whereas last year only a five-passenger body was accommodated.

The two chassis models will continue to be known as the 6-38 and 6-48 and the prices remain unchanged. The stock touring car on the smaller model as quoted for 1916 is $4,400 and for the larger chassis with touring body, $5,100.

PATHFINDER COMPANY REORGANIZED

Indianapolis, Ind., May 24—With an authorized capitalization of $250,000, the Motor Car Mfg. Co. has been reorganized under the name of the Pathfinder Automobile Co. Articles of incorporation for the new concern were filed with the Indiana secretary of state last Friday and a charter has been granted.

In the reorganization, the company has been strengthened. Charles W. Richards and Lea Kaminsky have bought stock in the concern. With George I. Lufkin, California agent for the Pathfinder, they are named as the incorporators. It is announced that the officers of the new company will be the same as those of the old, except that George Drawe has become sales manager.

A new name has been taken for the company in order that it may be more distinctive of the business. Plans are under way for increasing the output and the present season promises to be the most successful that the Pathfinder company ever has had.

DEALERS WIN IN COURT

New York City, May 22—The right of motor car dealers to use manufacturers' number plates on their cars when the cars are being used for purposes incidental to their sale has just been decided by the court of special sessions in favor of the Automobile Dealers' Association, which undertook the defense of T. P. Patterson, a chauffeur employed by the A. Elliott

Ranney Co., who was arrested for driving a car bearing a manufacturer's number.

The association attorney, Charles Thaddeus Terry, defended the case and contended that the law permits any dealer in motor vehicles to make use of the manufacturer's number plates on any of his cars when the car is in use for any purpose connected with the business of manufacturing or selling, including demonstrating, the operation of the cars on the streets for advertising purposes and the use of the cars by salesmen and managers in connection with business trips around the city or elsewhere. On consideration of Terry's contention, the court acquitted Patterson.

PERMANENT WRIT AGAINST E-Z-ON

Chicago, May 21—In a decision handed down recently by Judge Sanborn in the United States district court for the northern district of Illinois, in the case of the Parsons Non-Skid Co. and the Weed Chain Tire Grip Co., of Chicago., vs. E. D. Lewis, Thomas V. Garvin, M. J. Frambach et al, operating as the E-Z-On Chain Tire Protector Co. and the Hartley Mfg. Co., of Chicago, the preliminary injunction rendered in favor of the plaintiffs by Judge Carpenter at Chicago, in February, 1913, was sustained, a permanent injunction being ordered.

The original complaint was filed in the United States district court of the northern district of Illinois, February 4, 1913, Judge Carpenter granting a preliminary injunction against the E-Z-On company, which had begun manufacturing skid chains 3 months previously. The E-Z-On grip was constructed in a method similar to the Weed chain, the latter being protected under the Parsons patent. The former differed from the Weed somewhat, in that the side chain, instead of being a circle of ordinary wire link chain, was made with links of a peculiar design.

Brief extracts from Judge Sanborn's opinion are:

"The E-Z-On device is a substantial reproduction of the Weed chain grips made under the Parsons patent, its sole difference being in details. * * * That the defendants' device infringes the claims of the Parsons patent and contains the Parsons invention is clear. This, in itself, should dispose of the defendants' contentions in the present case, for the defendants have certainly adopted and are using the Parsons structure. * * * The defendants' main claim for their device in this case is to protect the sides of the tire and not to prevent skidding, but this is squarely contradicted in their circulars, advertising and preliminary injunction affidavits. * * * Irrespective of what the defendants claim was their object, the fact is that the E-Z-On grips are traction devices having the Parsons structure and operation to prevent skidding of cars in the way indicated by the Parsons patent. * * * The usual injunction should issue."

Engineers Pick Governors to Pieces

Merits and Faults Discussed at S. A. E. Meeting

NEW YORK, May 21—Governors, their merits and demerits, and the solution of the governor problem, was the general topic of discussion at the May meeting of the metropolitan section of the Society of Automobile Engineers, held here last night. Theodore Douglas and Frank H. Trego were the speakers of the evening, Mr. Trego's absence making it necessary for his paper to be read by the secretary.

That governors are advantageous in that they prevent damage to the vehicle and the motor from overspeeding was generally accepted by both speakers, but it was claimed by each that there are serious disadvantages to the usual form of governor in that they restrict the power and efficiency of the motor.

Each speaker had a radically different solution for the problem. Mr. Douglas advanced the theory that the limitations of the governor were due to its lack of development.

Mr. Trego declared that the simplex types of governors had severe drawbacks and that in eliminating these other difficulties arose from the additional complication, expense, and fragility of the device. He also strongly urged the desirability of higher speed on empty return runs than on loaded trips, which, he maintained, no governor of any type will permit.

In the discussion, the additional points of whether or not a certain amount of lag or sluggishness in the action of a governor is desirable; the possibility of decreasing piston travel by the use of a governor; the ethics of the driver question as related to the use of governors; the wisdom or folly of using the engine as a brake; and the determination of the proper gear ratio for use in a motor truck were brought up and discussed.

N. B. Pope advanced the theory that a governor should be devoid of lag, as far as possible, because of the slow pick-up of power when the throttle suddenly is opened. He also stated that the governor was not to be considered as a running device, but only as an emergency appliance. Most of the time the truck is running at speeds so low that the governor does not come into play.

Concerning lag, M. C. Horine described the loose-ball type of governor, as used on some trucks, the design of which is especially intended to produce a great lag, or sluggishness, so that while it prevents regular operation at a motor speed higher than that at which it is set, it permits the motor to attain considerably higher speeds for brief periods, thus giving additional flywheel power for use in getting out of bad positions.

Regarding the use of the engine as a brake, it was urged that this practice should be condemned as it has a tendency to draw the oil into the cylinders, where it is converted into carbon with very harmful results.

FAVOR U. S. L. REORGANIZATION PLAN

New York, May 22—The reorganization plan for the United States Light & Heating Co. is meeting favorable response. It is expected that the new company will have bought all assets of the old concern and should be in full operation by July 1. Opportunity for participation by stockholders in the reorganized company, which will carry the same name as the present one, but will be incorporated in New York instead of Maine, has been extended to June 1.

MAKING KNIGHT-MOTORED TRUCKS

New York, May 25—Special telegram—The Stearns company, Cleveland, O., has brought out a 5-ton truck equipped with Knight motor to be made in two standard chassis lengths, one with a 12-foot wheelbase selling at $4,500 and the other a special long 15-foot wheelbase selling at $4,800. Both models are equipped with four-cylinder 4¼ by 5½ Knight motors driving through a gearset and side chains. Front tires are 34 by 5 single and rear tires are 38 by 5 dual.

ITALY TO TAKE OVER PLANTS

London, England, May 22—Italian advices indicate that the government at Rome is prepared to take over all the private machinery shops in the Milan and Turin districts for the manufacture of war material. Many motor car shops at Milan, Turin and Genoa will be included in the list of works to be utilized for war munitions manufacturing, but for the present these plants will confine their efforts to turning out cars for the army.

TWO HUNDRED CARS IN TOUR

Atlanta, Ga., May 26—Fifty dusty cars with 150 dusty tourists will pull into Atlanta Thursday after an 800-mile swing around the state in the most successful tour of the state Georgia motorists have held. The run, known as the "Seeing-Georgia Tour," is being held under the auspices of the Georgia State Chamber of Commerce, and has for its object seeing the state and promoting the better acquaintance and closer interest of the people of the various sections.

The tourists left Atlanta last Saturday. The objective point of the tour was Quitman, Ga., where the tourists attended the Animal Industry fair.

On the greater part of the tour there were approximately 200 cars in line.

Speedway Construction Progresses in Two Western Cities

Track Between Minneapolis and St. Paul to Be Completed in August—Practice Opens on Chicago Oval June 2

MINNEAPOLIS, Minn., May 22—President F. H. Wheeler, of the Twin City Speedway, who spent a few days here this week, is confident that by August 15 all of the work of constructing the 2-mile oval will be completed and that the track will be ready for a race, which it is hoped will be staged towards the end of September. Work was begun 2 weeks ago and night gangs will soon be started.

The total investment will approximate $603,000, made up as follows: land, 343.5 acres, $142,000; concrete track, $181,000; grading of land for track and stands, $80,000; covered steel grandstands to seat 50,000 spectators, $100,000; four 60-foot tunnels under track, $50,000; fence, $10,000; garages and other buildings, $40,000.

The track is to be a cement oval 80 feet wide at all points and with 500-foot straightaways on each side. The banking on the curves is for a speed of 120 miles per hour, this banking being as a paraboloid curve rather than a straight incline. On either side of the track is a 2.5-foot cement wall extending all of the way around.

The grandstands are set 30 feet back from the track on the stretches and 40 feet back on the curves. Every precaution has been taken to safeguard the safety of spectators and contestants.

CHICAGO TRACK ALMOST COMPLETED

Chicago, Ill., May 22—Within 10 days, the first practice will be permitted on the new Chicago speedway. At that time the last nail will have been driven into the 2-mile oval, over which Chicago's first international 500-mile derby will be run June 19. The contractors originally promised to complete the track proper by June 5, but favorable weather, with an increased force of laborers, will result in beating the schedule's time by 3 days, at least.

Only the finishing touches on the home stretch and the turns leading into it remains. The superstructure for the entire course is up, but the two-by-four plankings will require the attention of the carpenters for the next 10 days. Then the construction of the grandstands, boxes and bleachers will begin. Three shifts of men, working 8 hours each, will be employed to insure the completion of this work at least 3 days before the race.

In the meantime, Director of Contests F. E. Edwards has been lining up the manufacturers and drivers and to date has secured sixteen entries, with promises of twenty or more by June 10, when the entry list closes. Following are the entries and drivers to date:

Stutz, Gil Anderson; Stutz, Earl Cooper; Stutz, Howard Wilcox; Mercedes, Ralph de Palma; Sunbeam, Porporato; Sunbeam, Morton; Sunbeam, Grant; Sunbeam, Limberg; Duesenberg, Ed O'Donnell; Duesenberg, Tom Alley; Maxwell, Orr; Maxwell, Rickenbacher; Maxwell, Carlson; Peugeot, Bob Burman; Bugatti, Barney Oldfield; DuChesneau, W. W. Brown.

COLUMBUS WANTS SPEEDWAY

Columbus, Ohio, May 21—Because of the large crowd which attended the race meeting held in Columbus May 15 and 16, when there were about 20,000 paid admission on 1 day, several Columbus men have started a movement to build a motor speedway similar to that at Los Angeles. One plan discussed is to have the owners of the Columbus driving park bank the turns and make the track more adapted for motor racing.

TROPHY FOR CHICAGO RACE

Chicago, May 23—A silver punch bowl, valued at $1,000 and donated by the Findeisen & Kropf Mfg. Co., maker of the Rayfield carbureter, will be awarded the winner of the 500-mile race to be run on the new Chicago speedway June 19. This is the first special prize to be announced. Permanent possession of the trophy will go to the driver first winning two races on the local oval. In addition to the punch bowl, the Rayfield maker has hung up $1,000 in prize money for cars equipped with its product, the purse to be divided as follows: $500 for first, $300 for second, and $200 for third.

DETROITER IN RACE GAME

Detroit, Mich., May 22—Another Michigan motor car manufacturer is going into the racing game. The Briggs-Detroiter Co., which makes the Detroiter cars, is now building a racing car that probably will be completed in time to be entered in dirt-track races, beginning in July. Details as to construction are being kept secret, but it is to be a four-cylinder job, with a specially-built motor. The remainder of the car is to be the standard stock Detroiter chassis, with a few minor changes, it is said.

HEARNE TAKES HOUR RACE

Cleveland, May 23—An afternoon of dirt track racing by the Maxwell and Case teams sent thrills up and down the spines of 10,000 spectators who gathered at the historic Camp Randall 1-mile track this afternoon to see the wheels go around and hear the motors roar.

Eddie Hearne, at the wheel of a Case, captured the feature event of the day, covering 58 miles in 1 hour of spectacular traveling. Eddie Rickenbacher sent his Maxwell to the front at the start and held the lead for 30 miles when engine trouble forced him to quit. Disbrow then acted as pacemaker for 20 miles, but Hearne stepped on the throttle of his mount just before the finish and swept to the fore.

Disbrow, driving his Simplex, captured the 3-mile event in 2 minutes 48⅘ seconds and drove the Jay-Eye-See an exhibition mile in 52⅖ seconds. Rickenbacher annexed first honors in the 10-mile race, Kennedy in an Edwards Special being second. C. H. Dailey, in a National, was victor over H. S. Thomas, at the wheel of a Mercer, in a special 15-mile match race.

RACE DRIVERS ORGANIZE

Indianapolis, Ind., May 24—The Automobile Drivers' Protective Association has been organized by about thirty of the drivers who will participate in the 500-mile race at the Indianapolis motor speedway this week. The association has filed articles of incorporation under the state voluntary association act, without capital stock.

Barney Oldfield, Harry F. Grant, Louis C. Erbs, Bob Burman and Earl Cooper constitute the first board of directors, while Paul H. Bruske, Oldfield and Erbs form a committee on by-laws.

The articles of association state that the organization is to protect the rights of drivers, to secure the enforcement of their contracts and adequate compensation and to safeguard the lives and property of the members.

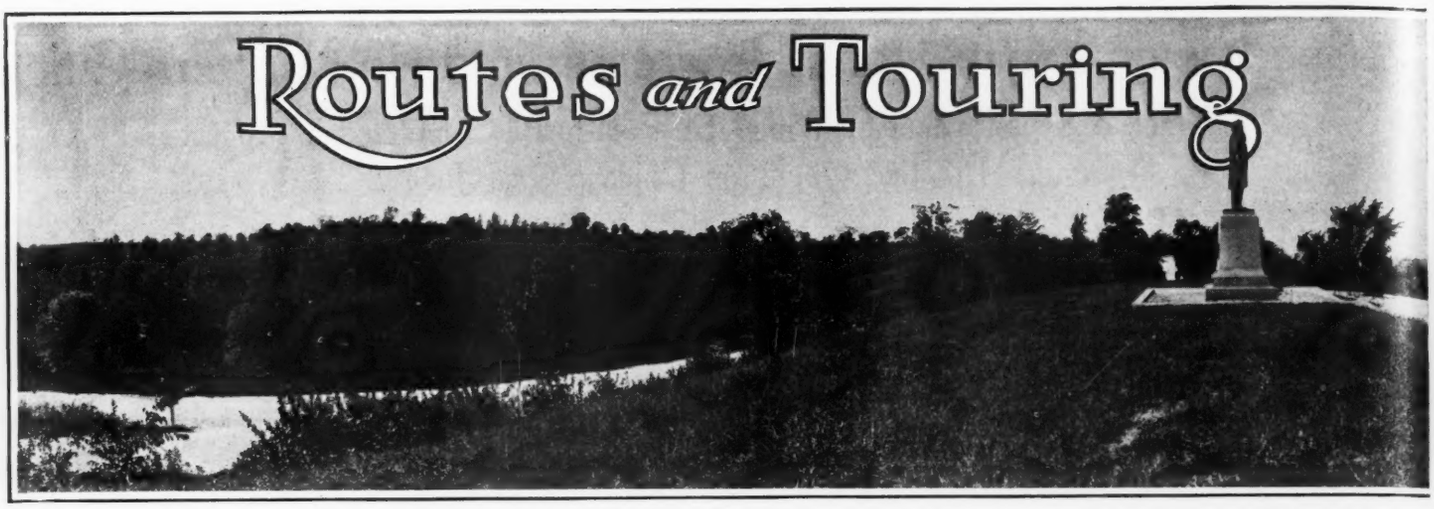
It is understood that ultimately the association will urge that drivers be permitted to share in the receipts from elimination trials and practice prior to the 500-mile race.

LINDLEY JUNIOR VANDERBILT VICTOR

San Francisco, Cal., May 22—Once again a Peugeot took racing honors on the exposition course. This latest achievement was in the 50-mile junior Vanderbilt cup race, Harold Lindley, of San Francisco, covering the course in 1:03:01. Harry Hartz, of Los Angeles, who held the former record with a Mercer, finished second in 1:04:15, and the third place was taken by Walton Cook, of Pasadena, in a Duesenberg.

All the spectacular incidents of a big race marked the contest. Interest was fanned by the fact that the cars were in sight continuously. Lindley got a good start and in a few laps overhauled Hartz, the favorite, maintaining a good lead until he finished, nearly a lap ahead of the former champion. The winner received a purse of $100.

Routes and Touring



PICTURESQUE DRIVE ALONG MISSISSIPPI RIVER IN RIVERVIEW PARK, HANNIBAL, MO., WHERE A

DES MOINES, Ia.-Fort Smith, Ark.

New Providence, Ia.—Editor Motor Age—Please give me the best route from Des Moines, Ia., to Fort Smith, Ark., and the distance.—J. M. Seward.

From Des Moines, drive to St. Joseph, Mo., 196 miles, through Indianola, Liberty, Osceola, Leon, Lamoni, Bethany, Albany, King City, and Union City. This highway is marked with blue and white bands and the roads are dragged. Proceed next to Kansas City, via Halleck, Dearborn, Edgerton, and Nashua; the blue and white bands will direct you.

Drive south to Joplin, Mo., 181 miles, through Peculiar, Harrisonville, Lone Tree, Rich Hill, Nevada, Sheldon, Lamar, and Jasper; and from there through Carthage, Diamond, Granby, Fairview, Exeter, Rogers, Springdale, Fayetteville and Winslow.

Chicago-Cresco, Ia.

Shullsburg, Wis.—Editor Motor Age—In Motor Age, issue of April 29, an inquiry from George W. Webster, Jr., was answered as to the best route from Chicago to Cresco, Ia., via Clinton and Dubuque, Ia.

If Mr. Webster is not particular about visiting Clinton, a shorter and better route would be via Elgin, Marengo, Rockford, Freeport, Warren, Ill., Shullsburg, Wis., Benton, Hazel Green and Fairplay. This route is more direct and a far better road. From Chicago to Shullsburg there are no hills to contend with, and from Shullsburg to Benton will be found some of the finest scenic views in southern Wisconsin. I have noticed for some time that Motor Age routes most all the western traffic via Geneva, DeKalb, Dixon and Clinton, while the Rockford-Freeport-Warren-Shullsburg route from Chicago to Dubuque is better as well as the most direct, and is over the proposed Grant highway.

Shullsburg is a lively little town in southwestern Wisconsin, with hotel accommodations. We would like to have a share of the western routing. We are on the Blue Book route, and this has been the main route from Chicago to Dubuque for several years. The local motor club, with the assistance of the business men's association, has raised money to mark the route from Warren, Ill., to Dubuque, Ia., and this work will be done as soon as possible.—Shullsburg Garage.

St. Petersburg, Fla.-Louisville, Ky.

St. Petersburg, Fla.—Editor Motor Age—Kindly give me a route from St. Petersburg to Louisville, Ky.—W. McKee Kelley.

From St. Petersburg go direct to Tampa over a paved road practically the entire distance.

Leaving Tampa go north to Live Oak, through Stemper, Drexel, Brooksville, Inverness, Ocala, Reddick, Gainesville, Hague, Fort White, Branford, O'Brien; and on through Falmouth, Ellaville, Lee to Valdosta.

Crossing the state of Georgia, the route is first to Macon, 149 miles, through Vienna, Sibley, Sycamore, Chula, Tifton, Lenox, Adel, Mineola, Valdosta; thence to Atlanta by way of Forsyth, Barnesville, Orchard Hill, Griffin, Orr's Station, Atlanta. A run of 127 miles through Marietta, Cartersville, Adairsville, Calhoun, Dalton, Ringgold, crossing into Tennessee and entering Chattanooga.

Tennessee is next crossed, and the first section to Nashville, 143 miles, is through Sequatchie, Monteagle, Pelham, Manchaster, Murfreesboro, and La Vergne. Nashville to Louisville, Ky., 205 miles, is via Gallatin, Bethpage, Sugar Grove, crossing the state line into Kentucky and going through Scottville, Cedar Springs, Glasgow, Cave City, Bear Wallow, Buffalo, New Haven, Bardstown, Mt. Washington, Louisville.

Volume 3 of the Blue Book covers routing from Tampa. Price $2.50. Blue Book Publishing Co., Chicago.

Minneapolis, Minn.-Seattle, Wash.

Chester, Ia.—Editor Motor Age—Kindly give me the route, via Yellowstone trail, from Minneapolis to Seattle; also the distance and condition of the roads.—E. H. Babcock.

From Minneapolis this highway will take you through Anoka, St. Cloud, Sauk Center, Alexandria, 141 miles; Ashley, Fergus Falls, Barnesville, Fargo, N. D., 123 miles; Buffalo, Valley City, Jamestown, Windsor, Steele, McKenzie, Bismarck, 207 miles; New Salem, Hebron, Richardton, Taylor, Dickinson, N. D., 120 miles; Belfield, Medora, Sentinel, Butte, Wibaux, Glendive, Fallon, Terry, Miles City, 200 miles; Carterville, Custer, Huntley, Billings, 161 miles; Laurel, Park City, Reed Point, Big Timber, Livingston, Mont., 127 miles.

If you desire to visit Yellowstone park, go down from Billings to Gardiner, the north entrance, retracing your steps back to Livingston.

Resuming your trip to the coast, continue west from Livingston through Bozeman, Logan, Three Forks and Whitehall to Butte, 139 miles; thence through Boulder and Clancy to Helena, 92 miles, and on to Missoula, 139 miles, via Deer Lodge, Drummond and Bearmont.

A side trip from Missoula to Glacier park would be most enjoyable, it being a trip of 167 miles through Arlee, Ronan, Polson, Rollins, Kalispell, Columbia Falls and Belton. Retrace your steps to Missoula and resume the westward journey through Arlee, Dixon, Thompson Falls, Murray, Wallace, Kellogg, Kingston, Coeur d'Alene and Post Falls to Spokane, a distance of 242 miles.

From Spokane the balance of the trip to Seattle, 346 miles, is through Davenport, Wilbur, Almira, Conlee City, Douglas, Wenatchee, McCallum, Cle Elum, Easton, North Bend, Kirkland and Kenmore.

Idaho Falls, Ida.-Milwaukee, Wis.

Milwaukee, Wis.—Editor Motor Age—Kindly give me the best route from Idaho Falls, Ida., to Milwaukee, Wis.—Leonard E. Meyer.

Drive down from Idaho Falls through Blackfoot to Pocatello, and on through McCammon, Malad City, Bear River City and Brigham to Ogden, 189 miles.

From Ogden, follow the Lincoln highway east through Croydon, Evanston, Granger, Rock Springs, Red Desert, Rawlins, Walcott, Medicine Bow, Laramie and Beauford to Cheyenne, 477 miles. Leaving Cheyenne, route through Pinebluff, Kimball, Sidney and Chappel, 133 miles. Here take the Chappell cut-off to Big Springs, avoiding Julesberg; this cut-off provides a shorter and better way. From Big Springs drive through Brule, Paxton and Sutherland to North Platte. Continue east via Gothenburg and Kearney to Grand Island, 163 miles; and to Omaha, 155 miles, via Central City, Columbus, North Bend, Ames and Fremont.

From here you have a choice of three trunk-line routes across the state to the Mississippi river. None of these three routes may claim any marked degree of superiority, although the Great White Way through Atlantic, Adair, Des Moines, Oskaloosa and Muscatine and the River-to-River road through Des Moines and Iowa City, both of which end at Davenport, are probably a shade better than the Lincoln highway through Cedar Rapids, which strikes the river at Clinton.

Leaving Davenport follow the Rock River valley to Sterling, 56 miles, through Moline, Hillsdale and Galt; 68 miles through Dixon to Rochelle; and thence 25 miles to Rockford. The last leg of the trip to Milwaukee is made through Beloit, Delavan, Elkhorn, Mukwomago and Waukesha, 95 miles.

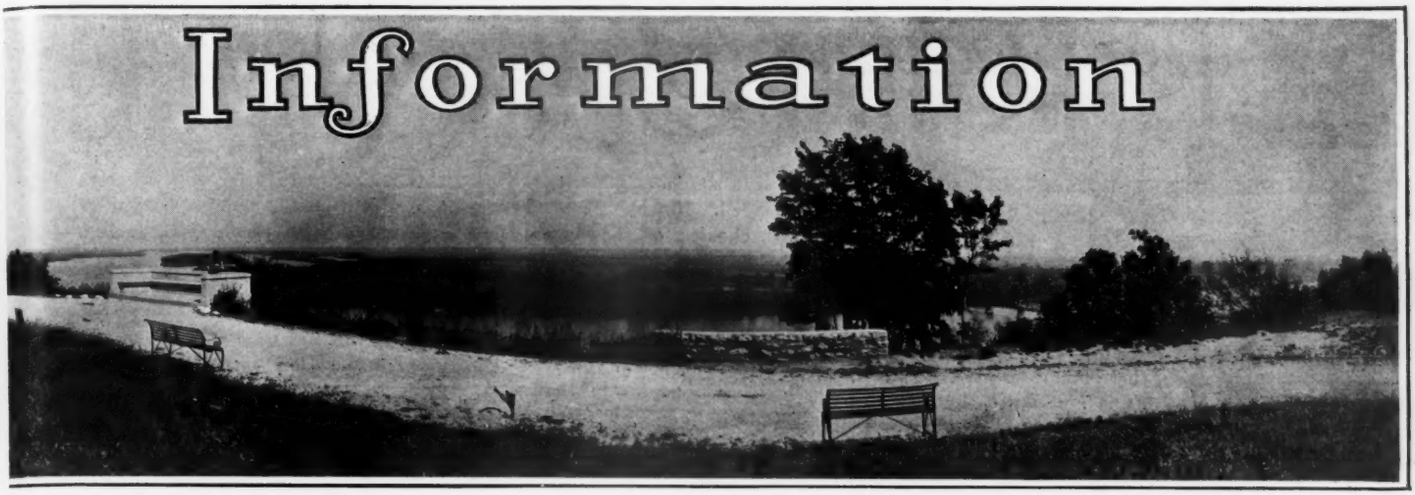
For this trip you should have volume 5 of the Blue Book which covers the portion from Idaho Falls to Dixon, Rochelle, DeKalb or Geneva, from each of which points you can turn north for Milwaukee. Volume 4 will furnish you with detailed directions from Davenport to destination.

Burnetts Creek, Ind.-Cambridge, O.

Burnetts Creek, Ind.—Editor Motor Age—Kindly give me the best route from Burnetts Creek, Ind., to Cambridge, O. I should like to go via Columbus if it is possible to have good roads.—F. A. Duffy.

From Burnetts Creek, drive east into Logansport, from which point you will have good roads all the way through Columbus to Cambridge. We suggest the following itinerary: Logansport, Kokomo, Marion, Petroleum, Mendon, Lima, Bellefontaine,

Information



STATUE OF MARK TWAIN, ERECTED ON THE BLUFFS, OVERLOOKS THE FATHER OF WATERS

Zanesfield, Marysville, Columbus, 238 miles. From Columbus route next to Zanesville, 60 miles, by way of Granville, Newark, and Hanover; and then to Cambridge, 23 miles.

When you reach Newark it would be better to inquire as to whether or not the old National road is open to traffic between Zanesville and Cambridge. This stretch has been designated for early improvement, and it is possible that it may be closed for construction purposes. In that case, turn northward just beyond Hanover and pass through Dresden and Coshocton to New Comerstown, and then straight down to Cambridge. From New Comerstown to Cambridge, however, is a very poor stretch of some 24 miles.

Chancellor, S. D.-Freeport, Ill.

Chancellor, S. D.—Editor Motor Age—I want to make a trip to Freeport, Ill., this summer. Kindly give me the best way to go from Chancellor.—E. C. Hofmeister.

Run east through Lennox to Canton, then drive 71 miles through Beloit, Hudson, Hawarden, and Westfield to Sioux City; east to Fort Dodge, Ia., 146 miles, via Le Mars, Cherokee, Storm Lake, and Pomeroy. Continue east to Waterloo, Ia., 107 miles, by way of Webster City, Iowa Falls, Parkersburg and Cedar Falls, and 90 miles through Independence, Earlville and Centralia to Dubuque. Now turn south and drive 67 miles to Freeport, Ill., through Fairplay, Shullsburg, Warren and Nora.

This takes you over fair-to-good dirt roads most of the way, with an occasional rough stretch. In the summer months, however, you should have no trouble.

If you would not mind adding about 40 miles to your trip you could drive from Sioux City down to Denison, 82 miles, via Holly Springs, Mapleton and Charter Oak, and then follow the Lincoln highway route, which is somewhat better than the direct route outlined above, through Carroll, Grand Junction, Boone, Marshalltown, Montour, Belle Plaine, Cedar Rapids, Mechanicsville, Wheatland and DeWitt to Clinton, 312 miles. From Clinton to Freeport, 57 miles, drive through Fulton, Lanark and Shannon.

Vicksburg, Miss.-Victor, Colo.

Vicksburg, Miss.—Editor Motor Age—Kindly give me the best route from Vicksburg, Miss., to Victor, Colo., also what is the distance and road conditions.—G. L. Larr.

Drive west across northern Louisiana to Shreveport via Tallulah, Monroe and Ruston, and thence to Dallas by way of Longview and Tyler. From Vicksburg to Shreveport, the road is quite poor but this is the only stretch which may cause you any difficulties. From Shreveport to Dallas, the road has been greatly improved of late and is now in fair-to-good condition practically all the way.

We suggest the following itinerary from Dallas: Route to Fort Worth, 33 miles of good gravel; then to Wichita Falls, 122 miles, a good dragged dirt road through Decatur, Alvord, Bowie, and Henrietta; go next to Childress over prairie road which is very good in dry weather; route 115 miles through Electra, Vernon, Chillicothe, and Quanah; and 130 miles to Amarillo, over similar road, through Estelline, Memphis, Clarendon.

To Clayton, N. M., is 132 miles over good prairie road with a few stretches of gravel, and is reached via Channing, Dalhart, and Texline. A run of 94 miles brings you into Raton, N. M., over a good natural road all the way, via Granville, and Deadman; thence 24 miles of good graded road to Trinidad.

Proceeding now to Pueblo, 93 miles, you will find the first 40 miles fair dirt; Walsenburg to Pueblo mostly macadam and gravel. A fine hard road through Beaver and Florence brings you into Canon City, 45 miles. It is but a short distance to Victor from Canon City.

In round numbers, the distance from Vicksburg to Shreveport is about 180 miles, and from Shreveport to Dallas some 220 miles. From Dallas to Victor the mileage is 820 miles. This makes the aggregate for the trip about 1,220 miles.

St. Joseph, Mo.-Baltimore, Md.

St. Joseph, Mo.—Editor Motor Age—We are planning a motor trip in June and would like to know the best route from St. Joseph, Mo., to Baltimore, Md., via Indianapolis, the Shenandoah valley and Washington; also a return route from Atlantic City via New York and Buffalo to St. Joseph. If there is a better route than this, would appreciate information on it.—C. N. Wills.

Drive east through Stewartsville, Hamilton, Chillicothe, St. Catherine, Bevier, Lentner, Honeywell and Rensselaer to Hannibal, 219 miles. Route next to Springfield, Ill., 106 miles, through Barry, Valley City and Jacksonville; to Indianapolis, 198 miles, by way of Decatur, Hammond, Tuscola, Newman, Chrisman, Montezuma, Rockville, Hollandsburg and Danville.

Now driving east to Columbus, O., 171 miles, route through Knightstown, Richmond, Vandalia, Springfield, Brighton, and Alton; thence to Wheeling, W. Va., through Dresden, Coshocton, Ulrichsville, Cadiz and Bridgeport, 153 miles.

From Wheeling, follow the Old National road 135 miles to Hagerstown, Md., through West Alexander, Beallsville, Uniontown, Somerfield, Grantsville, Frostburg, Cumberland, Hancock and Clear Spring. Turn south at Hagerstown and follow the Shenandoah valley pike through Martinsburg, Bunker Hill to Winchester, 41 miles; then east to historic old Frederic through Rippon, Harper's Ferry and Knoxville, 50 miles, and on to Washington, 51 miles, through Ridgeville, Gaithersburg, and Bethesda.

From Washington a fine new macadam highway will take you to Baltimore, a distance of 37 miles.

As for your return from Atlantic City to St. Joseph, via New York and Buffalo, we suggest that you drive up to New York, 132 miles by way of Port Republic, Lakewood, Marlboro, South Amboy, Perth Amboy, Rahway, Newark, Jersey City and Weehawken—West Forty-second Street ferry. Follow the east shore of the Hudson river through Peekskill and Poughkeepsie to Rhinebeck, there crossing over to Kingston and following the west shore through Catskill to Albany.

Leaving Albany follow the Mohawk valley trunk line through Schenectady, Amsterdam, Little Falls, Mohawk, Utica, Syracuse, Auburn, Geneva, Canandaigua, Avon and Corfu to Buffalo. From Buffalo continue west through Hamburg, Fredonia, North East, Erie, Conneaut, Ashtabula and Painesville to Cleveland; thence to Toledo passing Elyria, Oberlin, Norwalk, Bellevue and Woodville.

It is 162 miles to South Bend through Wauseon, Archbold, Bryan, Butler, Ligonier, Goshen, and Mishawaka, thence to Chicago, 100 miles, through La Porte, Michigan City, Crisman, and Hobart.

From Chicago go to Davenport through Geneva, Creston, Dixon, Sterling, Albany, Watertown and Moline. Follow the Great White Way to Des Moines passing Muscatine, Columbus City, Oskaloosa and Prairie City; and the Interstate trail to destination.

Chicago to Antigo, Wis.

Chicago—Editor Motor Age—For the benefit of any motorist wishing to drive from Chicago to Antigo, Wis., by way of Milwaukee, Manitowoc and Green Bay, would suggest that the directions given in volume 4 of the Blue Book be followed to Green Bay or Shawano.

From Green Bay, corner Main and Washington streets, go south three blocks and turn right, going over long iron bridge on Shawano street which runs into the Green Bay road and follow the main-traveled road to Shawano. From the corner of Green Bay and Main street, Shawano, turn right on Main street and follow the road which is direct but winding with a short sandy stretch just outside of Shawano. It is 45 miles from Shawano to Antigo, and good roads all the way, passing the Indian schools and through the Koshena and Neopit Indian reservations, and through Phlox at end of road. Turn right around saloon and follow the signs to Antigo.—H. T. White.

The Readers' Clearing House

GOBRON-BRILLE MOTOR OPERATION

Double-Piston Engine Used Abroad for Many Years

HARTFORD, Conn.—Editor Motor Age—Illustrate and describe the Gobron double-piston motor.—George Hayden.

The Gobron-Brille is a French machine that has been made for many years. It has a double-piston motor, there being two pistons in each cylinder. It is not, however, a double-acting motor in the ordinary sense of the word, because there is only one combustion chamber per pair of pistons, while with the double-acting motor there are generally two combustion chambers and one piston.

In the Gobron-Brille motor, Fig. 2, the two pistons move in opposite directions, the lower one being attached to the crankshaft in the ordinary manner, while the upper one is attached by the double connecting rod, as indicated. This construction calls for two crank-pin bearings, instead of one, as is usual, for each piston.

The object of using the double-piston construction is to reduce vibration. The force due to the reciprocating movement of the lower piston being neutralized by that of the upper one.

WHEN TO CHARGE FORD MAGNETS

Properly Magnetized, They Should Lift Twice Their Weight

St. Paul, Minn.—Editor Motor Age—How can one tell whether or not the magnets of a Ford magneto are properly magnetized?

2—What would be the effect of placing a stove about 5 or 6 inches long around the exhaust of a Ford car, and connecting it with the hot air intake?

3—When the engine of my 1913 model T Ford car has been idle and the throttle suddenly is opened wide, it chokes and misfires for a few seconds until it gains more speed, and then it runs perfectly. The ignition is good and it acts this way no matter how the carbureter is set. What is the reason for this?

4—Where may a complete list of all the cars manufactured in the United States be obtained?

5—Is there any method of removing the old grease from the differential of a Ford car without taking it apart?

6—What is the gear ratio in high of a Pierce-Arrow 6-66, Packard 5-48, and White 4-45?—O. F. Hoel.

1—When Ford magnets are properly magnetized they should lift and hold about twice their weight, or about 1 pound, but a better way to tell whether they are of the proper strength is to test the magneto for voltage. If the magnets are weak the magneto will show less than 15 volts when the motor is turning over at about 1,000 r.p.m. The voltage may be tested with an alternating current voltmeter and any electrician can test this for you. The Ford company will give a set of new magnets free of charge if you will return the old ones. This exchange applies to all 1913, 1914 and 1915 cars.

2—This would tend to vaporize the mixture more readily, enabling you to run on less fuel. It also would make for smoother running and more power.

3—Any motor may choke if the throttle is opened too wide suddenly when the motor is heavily loaded. However, under ordinary conditions, choking of the motor usually is due to a worn needle-valve, which allows of an over-rich mixture being fed at low speeds and the correct mixture after the car gains speed.

4—Motor Age published a list in its December 31 issue but the supply of that issue is exhausted.

5—This can be done by filling the housing with kerosene and operating the car

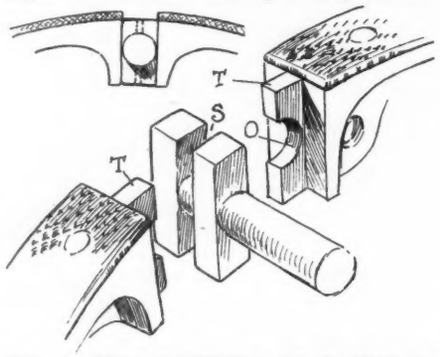


FIG. 1—HOW RATTLING OF BRAKES IS PREVENTED IN SCRIPPS-BOOTH

for about 1 hour. Then drain and repeat the operation. If this is done three or four times, the kerosene will dissolve the greater part of the grease.

6—The gear ratios of the cars you name follow: Pierce-Arrow 6-66, 2.88 to 1; Packard 5-48, 3.93 to 1, and White 4-45, 3.40 to 1.

SEEKS CAR AND RACE DATA

Chalmers Company Built First Vehicle in 1909—Other Models

Georgetown, Ky.—Editor Motor Age—What year did the Chalmers company put its first car on the market?

2—What were the models offered each year until the 1912 models were announced?

3—What are the eight largest American factories, considering output?

4—To whom may one apply for full information and entry blanks for the Elgin races?

5—Kindly give requirements for becoming a registered driver. Does a driver have to be 21 years of age to register, or drive, at Elgin?

6—Who does Motor Age consider the five best American race drivers?—S. G.

1—In 1909.

2—In 1909 the concern marketed two cars, a 30 and 40; in 1910, models K and J; in 1911, models 30 and 40; in 1912, models 30, 36 and 12. All of these were four-cylinder, except the model 12, which was a six.

3—Ford, Overland, Studebaker, Buick, Maxwell, Reo, Cadillac, Hudson probably are the eight largest producers of motor cars in America.

4—Apply Elgin Road Race Association, Elgin, Ill., or Chicago Automobile Club, Chicago.

5—Write to the American Automobile Association, New York, for application blank. You must be 21 years old, or over. to drive at Elgin.

6—This is a hard question to answer as you do not mention the particular type of driver. Some are leaders in road racing, others in speedway work.

SCRIPPS-BOOTH BRAKE FEATURE

How Rattling of the Bands Is Prevented in This Car

Chicago—Editor Motor Age—How is rattling prevented in the brakes of the Scripps-Booth? I understand they use some special device for preventing this annoyance.—J. P. J.

Great care must be taken with light car axles having very resilient springs to prevent any rattles in the axle, as these dance about so much quicker than a heavier car axle that the noise factors are more likely to appear than in big constructions.

One trouble with internal expanding brakes has been a liability to side slapping with a consequent rattle. This has been obviated in Scripps-Booth construction by forming a double cam S, shown in Fig. 1, while on either end of the expanding ring is a tongue T with a half-round notch O on either side, fitting the central section of the cam. In this way, the can itself prevents any side action of the brake bands and entirely prevents them from hitting the sides of the housing.

Dimensions of Buick 16

Afton, Ia.—Editor Motor Age—What are the cylinder dimensions of the 17 Buick and the 16 Buick?

2—What is the speed of the 16 Buick?

3—What is the method of operation of the Brown sub-base Ford oiler?—Jacob B. Gripp.

1—The Buick models 16 and 17 have cylinder dimensions of 4½ by 5.

2—About 45 miles per hour.

3—This was described in Motor Age issue of January 21, page 105.

Speed of Winton Six

Rochester, N. Y.—Editor Motor Age—What is the speed of the Winton light six?

2—Please show diagram of tank on this car to show reserve system.—A Subscriber.

1—Over 50 miles per hour.

2—This was described and illustrated in the December 3 issue of Motor Age in this department.

Converting Car to a Racer

Sycamore, Ill.—Editor Motor Age—I am rebuilding a model 16 Buick car into a racer and would like some advice.

Questions Answered and Communications Received

George Hayden	Hartford, Conn.
O. F. Hoel	St. Paul, Minn.
S. G.	Georgetown, Ky.
J. P. J.	Chicago, Ill.
A Subscriber	Rochester, N. Y.
E. L. Marshall	Sycamore, Ill.
A. C. Schluntz	Rembrandt, Ia.
J. O. Reavis	Decatur, Ill.
Frank Linz	San Angelo, Tex.
T. B. Bonham	Tacoma, Wash.
S. A. Pearce	Westport, Ind.
R. T.	Terlingua, Tex.
Jacob B. Griff	Afton, Ia.

No communications not signed with the reader's full name and address will be answered.

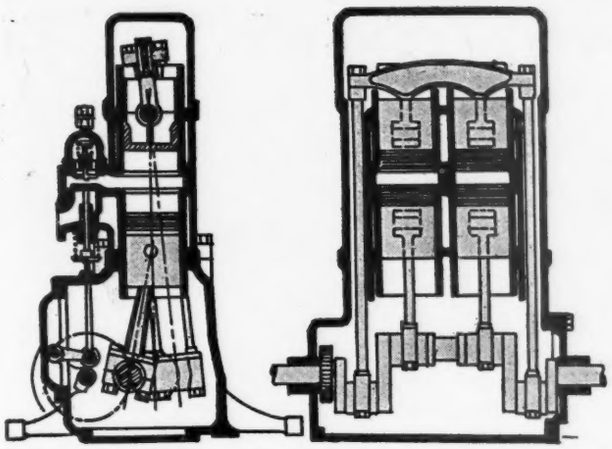


FIG. 2—SECTIONS THROUGH GOBRON DOUBLE-PISTON MOTO

1—What effect would porting cylinders have on increasing speed? Would Motor Age advise same?

2—The car is now equipped with 34 by 4 tires. Would it not be advisable to use 32 by 4½-inch, changing the wheels?—E. R. Marshall.

1—This reconstruction may result in a little increase in power, but it is not worth the trouble and expense.

2—The 34 by 4 tires properly inflated would be better able to withstand the hard usage.

OLD TWO-LUNGER FIRES ON ONE

Give It Air by Adjusting the Carbureter Air Valve—Work Easily Done

Rembrandt, Ia.—Editor Motor Age—What can we do to remedy the trouble we are having with a two-cylinder Auburn? The engine has about 40 pounds compression on front cylinder and 35 pounds on rear. When it is running slowly it will fire regularly, but when spark is advanced and throttle opened it will hit irregularly. Ignition seems good. We have tried new coils, timer, etc., also have bored holes in intake manifold and put in priming cups. If we open up cup on rear cylinder and give mixture more air it seems to run better. It has old type Schebler carbureter.—A. C. Schluntz.

The trouble apparently is with the carburetion and from the symptoms you give it is probable that the trouble is due directly to a poor adjustment of the air valve. While the motor is running and misfiring, open the air valve a little at a time with a pencil and if the misfiring stops, because of the additional air admitted, then reset the air valves so it will open sooner. It also would be a good plan to cut down on the fuel supply slightly by closing the needle valve a little. Do this while the motor is running and misfiring. Turn the valve slowly until the misfiring stops. If it does not stop then get it where it was before and attend to the air valve.

WANTS RELIEF FROM MISFIRING

Probably Cause Due to Poor Valve Timing —Perhaps Coil Is at Fault

Decatur, Ill.—Editor Motor Age—What test could I use to determine whether the magnets of a 1910 Ford magneto need recharging?

2—How much weight ought they lift when charge is complete?

3—What would cause front cylinder to miss? The other three are good, spark is good, in front cylinder, compression is fair, valves have just been ground, and carbon cleaned.—J. O. Reavis.

1 and 2—Read the answer to O. F. Hoel in this department. The charge for new magnets, if the old ones are returned, is $2.

3—It is probable that the valves of No. 1 cylinder do not open and close at the proper time because of worn valve stems. This would cause misfiring in that cylinder only. However, Motor Age is of the opinion that the trouble is due to ignition. It may appear that the spark is good, still it may be too weak to cause firing in the cylinder and for this reason it is supposed the trouble is with No. 1 contact in the commutator. This may be hilly or cut. The misfiring also may be caused by poor coil adjustment. Carefully examine the interrupter points of No. 1 coil.

PROPER CARBURETER FUEL LEVEL

Most Makes Have It ⅛ to 3/16 Inch Below the Nozzle Outlet

San Angelo, Tex.—Editor Motor Age—I am a mechanic and have lately been having some experience adjusting different makes of carbureters. I would like to know if Motor Age could tell me an easy way to find the proper adjustment of fuel that should be in the float chamber in different makes of carbureters. The fuel when coming in the float chamber of the Schebler carbureter and when stopped by the float valve, should measure 23/32 inch from top of chamber to level of fuel. A man came to me with a carbureter off an E-M-F 30 car and tried to dry the float. He got the float valve out of adjustment. How can I find the best adjustment of fuel in the chamber? Some carbureters are adjusted ⅛ inch below nozzle, but that method may be good only on certain makes of carbureters. Could there be a certain quantity that could be put in the chamber that would make a fair adjustment?—Frank Linz.

You will find that practically all modern carbureters will give good results if the level of fuel in the float chamber is ⅛ to 3/16 inch below the nozzle outlet. It may be difficult in some cases to get exact measurements, but a safe way would be to first get the level well below the nozzle opening and then gradually raise the level.

Discarding Leather for Fabric Facing

Tacoma, Wash.—Editor Motor Age—Will it be necessary to change the bevel of the clutch face in a Flanders 20 when refacing with Thermoid?

2—The flywheel facing is now a rough lathe finish; would Motor Age advise a smooth finish?

3—Will a smooth operation of the clutch eliminate rear end trouble on this car?—T. B. Bonham.

1—No change in the cone is necessary.

2—A smooth finish will not make any difference.

3—It may not eliminate the trouble, but it helps.

MEASURING GASOLINE IN TANK

Making a 15-Inch Stick Tell Quantity of Fuel at All Times

Westport, Ind.—Editor Motor Age—How may I tell how much gasoline there is in a cylindrical tank, 33 inches long and 14 inches in diameter, by measuring with a 15-inch rule?

2—What can be done with a leather-faced cone clutch which slips after the car has been run from 45 to 60 miles? The leather and spring seem to be all right.—S. A. Pearce.

1—The following table shows what the stick should show when any quantity from 1 to 22 gallons is in the tank:

Gallons in Tank	Depth in inches	Gallons in Tank	Depth in inches
1	1.53	12	7.50
2	1.96	13	7.95
3	2.44	14	8.60
4	3.35	15	9.15
5	3.92	16	9.52
6	4.55	17	10.15
7	4.95	18	10.69
8	5.50	19	11.20
9	5.95	20	12.05
10	6.50	21	13.00
11	7.00	22	14.00

2—The leather probably has lost its body. New leather or treatment with neatsfoot oil or Fuller's earth is recommended. The oil is better, for it swells the leather.

Fuel Tank is Leaking

West Salem, Mass.—Editor Motor Age—Gasoline leaks out of the tank of my 1914 Studebaker 4-25. It is three-cornered and the gasoline seems to leak out of one corner. Could Motor Age suggest some means of stopping this leak by putting something in the tank? I have tried putty on the outside, or can it be repaired by soldering only?—Archie Wolf.

The best thing you can do is to have the tank soldered at the point where it leaks. Plugging with putty and such substances will help for short periods only.

Disco Wiring Diagram

Terlingua, Texas—Editor Motor Age—Please give a diagram of the Disco starting system used on Krit cars.—R. T.

A wiring diagram of the Disco starting and lighting system used in Krit cars is shown in Fig. 3.

Anti-Rattlers Not Given Gratis

In the April 8 issue of Motor Age, in this department, it was stated, in answer to a reader's inquiry that the Maxwell company will furnish gratis a set of springs to eliminate rattling of the brakes on the 1914 model Maxwell 25. The company informs Motor Age that these springs are not furnished gratis, but that the 1915 models are regularly equipped with these anti-rattlers.

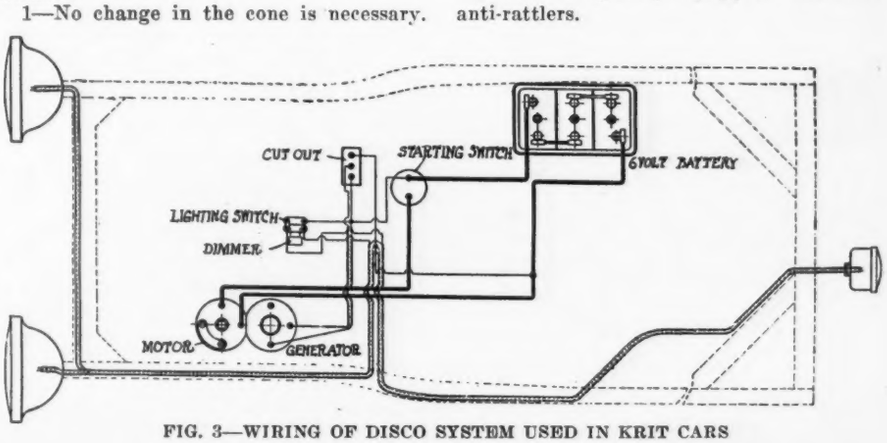


FIG. 3—WIRING OF DISCO SYSTEM USED IN KRIT CARS

The Accessory Corner

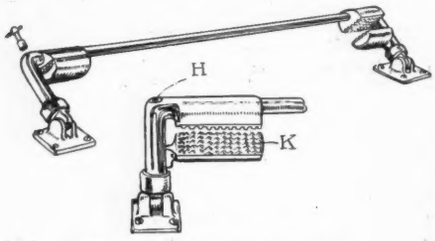


FIG. 1—BROWN ROBE RAIL

A small key when operated moves the jaws K which hold the robe securely and prevent its removal. The jaws are rubber lined

Brown Safey Robe Rail

MOTOR car thieves have, temporarily at least, abandoned the thought of the stealing whole cars and have concentrated their efforts, to a large extent, to the stealing of car accessories, such as robes, etc. In order to prevent the removing of robs, etc., from the car, the Minnesota Motorobe Co., Duluth, Minn., has brought out the Brown safety robe rail, shown in Fig. 1. This is a unique and simple rail which holds the robe firmly between the two jaws K which are locked and cannot be opened without the proper type of key. As shown in the illustration, there is a jaw at either end and these jaws are movable by turning a key which fits into hole H in the top of the rail. With the jaws open a part of the robe is inserted and the jaws then locked.

Affa Rod Silencer

In order to prevent rattling of the spark and throttle rods of the Ford car, W. S. Graffman, Northampton, Mass., has introduced the Affa silencer which is in the form of a steel band which passes around the steering post and presses against the rods so as to hold them firmly. The illustration in Fig. 3 shows the method of application. Price is 25 cents per pair.

Superior Bolt-on Lamps

The Superior Lamp Mfg. Co., 136 West 52nd street, New York, is manufacturing a special Ford bolt-on electric side and tail lamp, designed to fit all 1915 Ford cars.

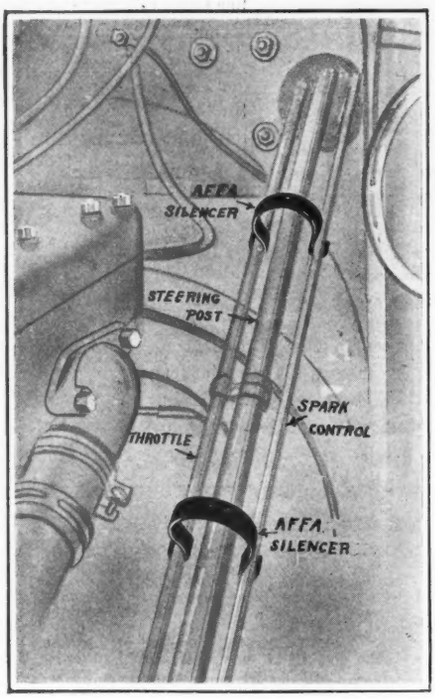


FIG. 3—AFFA ROD SILENCER

A Ford device for preventing rattling of the spark and throttle rods

A screw and nut arrangement form a support and part of the lamp and fits directly into the flanged bracket projecting from the windshield.

The lamps are finished in black and brass. They can be had in black and nickel finish if specified.

Superior bolt-on side lamps list at $4.50 per pair and the tail lamp at $1.20.

Attaching K-W Master Vibrator

Owners of 1915 Ford cars wishing to install a K-W master vibrator will find that the place of attachment is different than it has been in the past. Instead of attaching the coil to the dash and in line with the four-unit coils, the K-W is fastened to the side of the body, as shown in Fig. 5, a special bracket being used for support. The K-W, as with all master vibrators, does away with the use of the four coils. The master is made in two types one with a Yale lock for the switch and the other with the regular kick switch. The former is the more improved type as it can be used to lock the ignition system. The kick-switch type sells for $15 and the other for $16.

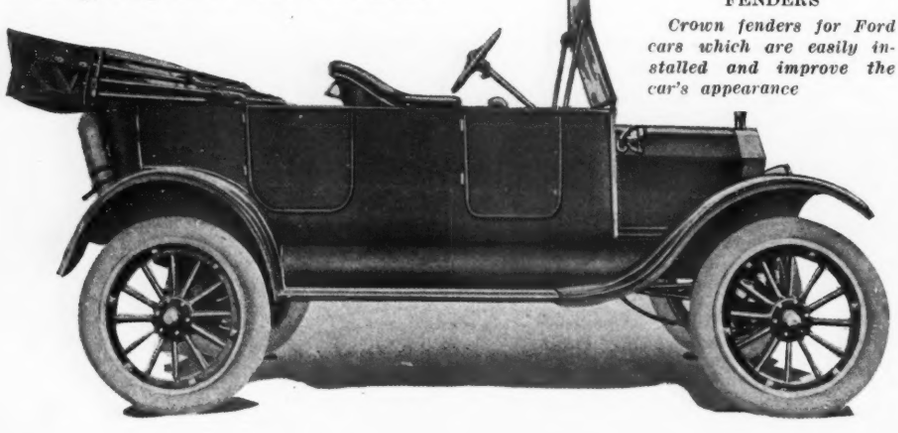


FIG. 2—UNIVERSAL FENDERS

Crown fenders for Ford cars which are easily installed and improve the car's appearance

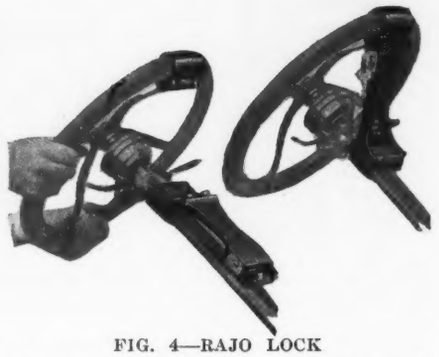


FIG. 4—RAJO LOCK

Designed especially for Ford cars and prevents the steering wheel from being turned

Universal Crown Fenders

The Michigan Crown Fender Co., Detroit, Mich., is offering Ford owners, the Universal Crown fender, designed to give the car a more graceful appearance. These fenders, made of heavy steel, are oval shaped, as shown in the illustration in Fig. 2 and have no protruding rivet heads. The fenders are 10 inches wide and have a crown ¾-inch high and 8 inches wide. No alterations in the car are necessary to install them, the old fender irons being used as supports. Price is $16 per set.

Time Study Watch

A time-study watch by means of which an employer is able to determine the rate at which a man is turning out work, is announced by Mortimer J. Silberberg, Peoples Gas Bldg., Chicago. This instrument is a great convenience in ascertaining the number of operations per hour being performed or the rate for any fraction of an hour and has a novel feature of time takeout. This is used when a workman suddenly stops his work, to oil the machinery perhaps, and the indicating hand does not return to zero. The watch, shown in Fig. 8 has a dial divided into tenths and hundreths of minutes and in addition contains figures 1-50 minute apart. The watch indicates at any point of elapsed time the corresponding output per hour. For example, if it requires .76 of a minute to perform one operation, as shown by the stopping of the large hand, the reading 78.9 directly under it is the corresponding output per hour. If the hand is stopped over .36 of a minute the reading directly under it shows the output to be 167 per hour.

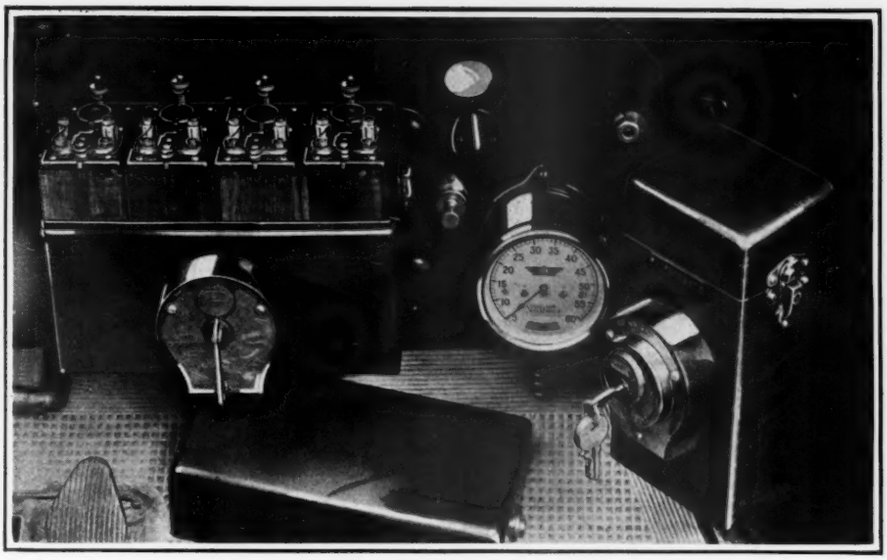


FIG. 5—K-W MASTER VIBRATOR INSTALL ATION

How this coil is attached to the 1915 Ford car. In former models attachment was on the dash instead of at the body side, as shown above.

A small attachment at the left of the stem is the time-out control which stops the hand at any desired point on the dial. Price is $15.

Atlas Fuel Improver

The Atlas Gasoline Improver Co., 63rd street and South Park avenue, Chicago, has put on the market a fluid for the purpose of increasing the effectiveness of fuel. It is put up in packages containing five small phials of the material, each phial being sufficient to treat 3 gallons of gasoline. It is claimed that the substance will increase the mileage per gallon and also increase the speed for a given throttle opening.

The exact composition is a secret, but an analysis shows that it does not contain any of the common constituents used for doctoring fuel. A test by an analytical chemist showed that there was no ethyl ether, picric acid or camphor present.

A test recently was made upon the substance by a representative of Motor Age. A Ford car was used in the experiment and after the tanks had been drained and the motor allowed to run until it came to a stop 1 quart of measured untreated fuel was poured in. The throttle opening was fixed to a definite point and locked in this position and the spark also fixed. On the quart of plain gasoline, the car ran 6.5 miles, at an average speed of 17.1 miles per hour.

At the completion of the first run after the motor had come to a stop, the car was brought back to the starting point and a quart of the treated gasoline placed in the tanks, which were emptied in the same manner as previously. Under the conditions of the same spark and throttle setting the distance traveled by the car was 7.3 miles and the average speed 20 miles per hour. A Jones speedometer was used to record the mileage. The price of the improver is 25 cents for sufficient to treat 25 gallons of gasoline.

Rajo Ford Car Lock

A novel type of lock for use on Ford cars has been brought out by the Mudd Auto Lock Co., 124 S. Clinton street, Chicago, under the name of the Rajo. This lock secures the steering wheel, preventing it from being turned. The Rajo consists of two parts, one clamped to the steering post and the other to the wheel. The former is hinged to the post and when not in use rests upon the post as shown in Fig. 4 at the left. When required to lock the wheel it is brought into position as shown at the right and the tumbler lock turned. When in this position all screw heads are covered so there is no chance of the device itself being removed. It is made of cast steel, nickel or japan finish. Price is $10 and the keys furnished are numbered and registered with the company.

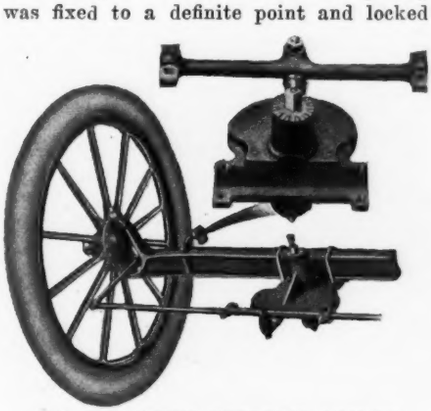


FIG. 6—SAFETY STEERING DEVICE

A Ford fitment which is said to make steering easier and safer

FIG 7—TWO NEW TOOLS

Pistol Grip hack-saw frame and new type valve grinder

Safety Steering Device

Another steering attachment has made its way to the market under the name of the Safety Auto Steering device and is manufactured by the Safety Auto Steering Device Co., 164 N. 3rd street, Philadelphia, Pa. This is designed especially for Ford cars and is said to make steering easier and safer by preventing the front wheels from wobbling, or the steering mechanism from being over-sensitive to every bump and depression in the road. Like most of the others on the market, this fitment is attached to the front axle, as shown in Fig. 6, and controls the steering cross rod.

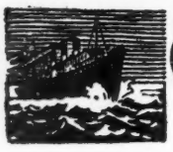
Pistol Grip Hack Saw Frame

A novel type of hack-saw frame is being marketed by the Goodell-Pratt Co., Greenfield, Mass., under the name of the Pistol Grip from the fact that the handle resembles that of a pistol. This construction is used because, it is stated, it is easier to saw, and adapts itself to different-size hands. The illustration in Fig. 7 shows this new device, with the thumb nut for blade adjustment. The frame is adjustable for blades of from 8 to 12 inches in length, is made of nickel-plated steel, strengthened by a sheath at the top. The handle is made of a black rubber composition. Price is $1.50.

Another accessory which this concern is marketing is valve grinder, shown in Fig. 7, which sells for $2.50. The mechanism for oscillating or revolving the shaft is inclosed in a cast-iron housing. When made almost entirely of aluminum, the price is $5. It may be fitted with either a blade or adjustable spanner, both of which are part of the equipment.

FIG. 8—TIME-STUDY WATCH

A form of stop watch which registers the number of operations per hour at any elapsed time. It also has a time-out feature



From the Four Winds

PACKARD Prairie Schooner—J. N. Williamson, former congressman, but now a resident of Prinville, Ore., is a recent purchaser of a Packard car which has been fitted up to represent a prairie schooner. It will be used to carry him over his large sheep ranches and provides every convenience possible on the plains.

136,759 Ohio Motors Registered—According to a report made by W. H. Walker, Ohio registrar of motor cars, 136,759 cars were registered up to and including May 12. Mr. Walker predicts 170,000 registrations for the entire year.

Car Registration in California—According to the figures issued by the California motor vehicle department at Sacramento, northern California is overcoming the boasted 55 per cent lead the southern part of the state has claimed. California has two registration offices, one at Sacramento and another in Los Angeles. For the last 2 months the Sacramento office has been collecting $1,000 a day more than the Los Angeles office, and is now within $33,000 of being even with Los Angeles in registration collections.

Indiana Registration Record Broken—Previous records for issuing motor car licenses are being broken in Indiana. Thus far the secretary of state has issued more than 75,000 licenses for 1915 and it is believed the total number for the year will be in excess of 90,000. There were 66,500 licenses issued during 1914.

Hill Climb Show Week Feature—One of the features of the recent motor show held by Spokane dealers was a hill-climbing contest. The course was 2,074 feet long with an average grade of 8.05 per cent, the maximum pitch being 17.5 per cent. A stripped-chassis Ford, driven by Harry Bell, made the best time, 40 seconds flat, or 36 miles per hour. A National, driven by George H. Beck, was second, making the distance in 41⅘ seconds, and a Cadillac eight, third, in 44⅗ seconds.

Railroad Passengers Transferred by Motor—A fleet of motor cars began operation May 22 over the new state highway between Tehachepi and Marcel, Cal., to handle passengers of the Southern Pacific and Santa Fe railroads, around the burned out tunnel that has lately tied up all San Joaquin valley service over both roads. All passengers will be handled subject to the motor car transfer.

Premier Transcontinental Caravan—When the Premier transcontinental motor caravan, which is to tour to the Panama-Pacific exposition in July, reaches the exposition, it will be reinforced by a delegation of Premier motorists from southern California. The movement was started there a few days ago by Premier owners who intend motoring to the exposition. They decided to form a touring party and meet the eastern Premier owners at the fair. Twenty owners are already listed for the trip from Los Angeles.

Charge Laxity in Tax Law—Philip Cook, secretary of state in Georgia, proposes to go the limit of his authority in enforcing the motor tax law in certain counties of the state where motor car owners refuse to pay the $5 license. From 8,000 to 10,000 car owners are said to have ignored the law, and county commissioners of at least one county take a stand opposite to that of the secretary of state, who maintains that failure to register a car is a misdemeanor for which violators can be prosecuted. The commissioners say there is no penalty provided for failure to obey this particular statute. The opinion has been advanced that it is within the power of the secretary of state to put the cars on the block and sell them at public auction, but the outcome of the contest is largely conjecture at present.

Huerta Becomes a Motorist—Victoriano Huerta, ex-provisional president of Mexico, has come to America to live, leasing a great country house at Forest Hills, L. I., where he has located his family and menage. He has purchased two Chalmers cars, both of which are equipped with Ajax tires. He has a very large family and many dependents to tote around, so the cars and tires will both be tested to their limits, no doubt.

Motor Truck Efficiency Proven—That hauling by motor truck effects a saving of 50 per cent over horse-drawn vehicles has been proven by comparative figures submitted by William H. Smith, county road superintendent of Will county, Ill. He finds that the motor truck hauls approximately 22 yards of crushed stone from the penitentiary to the new Troy road, a distance of 4.4 miles, for $13, or 65 cents per yard, distributing the stone as it goes. When teams are used, four laborers are required to scatter the material, and 36 yards can be handled at an expense of $46, exclusive of switching charges, which adds $7.

Legislate Against Toll Bridges—The Pennsylvania legislature recently passed a bill condemning all toll bridges on the main highways, on the same plan that the state may condemn toll roads.

Legislator Given Motor Car—Residents of the Puyallup valley, Washington, have given W. H. Paulhamus, former state senator, a Dodge motor car as a token of their appreciation of the good he accomplished for his district.

Passports Unnecessary to Enter Canada—Motorists will have no difficulty with immigration officers in entering Canada, according to an official announcement received by authorities of British Columbia from the superintendent of immigration at Ottawa, Ont. Reports had reached Washington motorists that passports would be necessary in order to motor into the Dominion, but this ruling removes all doubt on the question.

Motor Enthusiasts to Race 315 Miles—A race of 315 miles to Minneapolis is scheduled for June 5, between Walter J. Hill, son of James J. Hill, railroad president, whose business address is Northcote, Minn., and A. F. Harland, of Chicago. A side bet being arranged. It will be an endurance run, replenishing of gas tanks and necessary repairs being allowed. Hill will drive a Packard and Harland a Marmon.

Tacoma Races Get Boost—Entries for the Tacoma races July 4 and 5 have received a boost, the latest to come in being the Maxwell team with three cars. Wild Bill Endicott and Coal Oil Billy Carlson are nominated as drivers, with Arthur Klein a possibility for the third car. Besides these Captain Kennedy has been entered with the Edwards Special and Jennings with the Keeton. This will give to the Tacoma races two cars which never have appeared here, as well as some new drivers. Earl Cooper, who has been crowned victor for the past 2 years at Tacoma, will be on the tape with his Stutz. Luckstrell and Nikrent, now at Indianapolis, will be at the wheels of Mercers.

Spokane's First Motor Show—Spokane's first motor show held the attention of the dealers and thousands of interested spectators, who thronged the famous Davenport hotel, which had been changed from the lap of luxury to a luxurious garage and made an ideal setting for cars of many makes, including the Overland, Chalmers, Paige, Buick, Maxwell, Haynes, Saxon, Hupmobile, and Dodge. A feature of the opening day was the automobile parade, in which 1,000 to 1,200 machines were in line. Floral decorations were used.

Grasshoppers Interfere with Motoring—Grasshoppers are causing difficulty in Arizona motoring. Recently Phoenix and other towns in the Salt River valley were visited by a plague of grasshoppers. Thousands flew and crawled under each street light. In the paved district of Phoenix, the pavements soon became slippery with the bodies of the insects, crushed under the tires of cars. Several machines skidded and there were two or three near-accidents. There are unconfirmed reports that the windshields of moving cars were cracked by coming in contact with flying grasshoppers.

Coming Motor Events

CONTESTS

*** May 29—500-mile speedway race, Indianapolis, Ind.**
May 30-31—Track meet, North Yakima, Wash.
May 31—Track meet, Newark, N. J.
May 31—Track meet, Rochester, N. Y.
May 31—Track meet, Salt Lake City.
June 5—Track meet, Pittsburgh, Pa.
June 5-6—Track meet, Walla Walla, Wash.
*** June 9—100-mile dirt track race, Galesburg, Ill.**
June 12—Track meet, Brighton Beach, N. Y.
June 12-13—Track meet, Seattle, Wash.
June 17—Track meet, Boston, Mass.
June 19—Track meet, Hartford, Conn.
***June 19—500-mile speedway race, Chicago.**
June 19—Track meet, Allentown, Pa.
June 20—Track meet, Centralia-Chehalis,
June 24—Hill climb, Uniontown, Pa.
*** July 3—300-mile race, Sioux City, Ia.**
July 4—Road race, Chico, Cal.
*** July 4-5—Speedway races, Tacoma, Wash.**
*** July 5—Road race, Visalia, Cal.**
*** July 5—Speedway races, Omaha, Neb.**
July 5—Track meet, Lewiston, Me.
July 9—100-mile dirt track race, Burlington, Ia.
July 11—100-mile dirt track race, Milwaukee, Wis.
July 31—Road race, Denver, Colo.
August 14—Dirt track races, Janesville, Wis
***August 20-21—Elgin road races, Elgin, Ill.**
August 28—100-mile dirt track race, Kalamazoo, Mich.
September 6—Speedway races, Detroit, Mich.
September 6—Speedway races, Providence, R. I.
September 24-25—Track meet, Grand Rapids, Mich.
October 1-2—Track meet, Trenton, N. J.

*** Sanctioned by A. A. A.**
October 2—Speedway races, New York.

SHOWS AND CONVENTIONS

June 14-17—Summer meeting of Society of Automobile Engineers, Detroit and Great Lakes cruise.
September 13-19—Pan-American road congress, Oakland, Cal.
January 1-8—New York show.
January 22-29—Chicago show.

Good Roads Activities

Road Congress at Cedar Rapids—The next annual meeting of the Northwestern Road Congress, organized last October in Milwaukee, Wis., will be held this fall at Cedar Rapids, Ia.

Insufficient Funds Retard Highway Work—The Ohio department of highways has notified contractors and road builders that the letting of contracts which was to have been done May 14, has been held up indefinitely.

To Build Road Over Dunes—Plans are being formulated to overcome the barrier of sand near Brownsville, Tex., that extends from the Gulf of Mexico inland for nearly 100 miles, preventing through motor travel between certain points on the coast. It is planned to construct a highway across this 25-mile stretch of sand, the work to be done jointly by Cameron and Willacy counties. It has not yet been determined what material will be used for the proposed road. Sand drifts badly and often forms great dunes, making the project a difficult one. Even the railroad which crosses this sand belt must keep a force of men constantly employed removing sand from the track. There is a good system of motor highways in the lower Rio Grande valley and a connection with the roads of the other parts of the state is desired.

Travel Over New Highways—Two newly constructed highways in Washington, the Sunset road across the Cascade Mountains and the Olympic highway that penetrates the wonderfully scenic Olympic peninsula, have been conquered by motor cars. James P. Scearce and Henry Heiser, driving a Metz roadster, were first to take a motor car over the Sunset highway through Snoqualmie pass, having accomplished the task after 2 days of strenuous struggle with mud. This route just recently was completed by the state of Washington at a cost of more than $300,000 and provides the first means of vehicular transportation between the east and west sides of the state. Snoqualmie pass will be cleared and open to travel not later than June 1. Kenneth Hart, of Quilcene, is the first motorist to traverse the Olympic highway to Seattle. His trip marks the actual opening of this scenic and commercially important highway that connects Seattle and Tacoma with the rich peninsula country.

New Route to Los Angeles—Southern California is to benefit by the establishment of a new branch on the western end of the Lincoln highway, whereby it will be possible for the westward-bound motorist to take his choice at Ely, Nev., of using the northern route ending in San Francisco or the southern route with Los Angeles as its terminal point. The new branch runs southwest from Ely through Tonopah and Goldfield in Nevada, across the California line and southward through Big Pine, Independence, Lone Pine, Freeman and Mojave to Los Angeles. The advantages of the new southern route are most obvious. The northern routes in crossing California have an altitude of something like 8,000 feet, which necessitates their being closed to motorists practically 7 months of the year. The southern route makes the crossing at a much lower place in the Sierras and is open practically the whole year round.

Last Maryland Toll Road Passes—The old Reisterstown turnpike leading into Baltimore was turned over to the State of Maryland May 22. The toll-gates were destroyed. This marks the passing of the last toll road in Maryland.

Montana Good Roads Day—June 15 has been set by Governor Stewart as the day on which residents of Montana shall contribute labor, material and money toward the improvement of public highways. This will be the first good roads day ever proclaimed for the state of Montana. Hearty co-operation has been promised.

Illinois Highway Marked—The Ocean-to-Ocean highway has been marked across the state of Illinois. This trail enters the state at Hannibal, Mo., and passes diagonally to the northeast, crossing the Indiana line near Dana, two broad bands—one of red above one of white—being painted on all poles along the route. Farmers and highway commissioners are cooperating to keep this road up to the highest efficiency possible.

Road Improvements Entail $741,488—Plans for 112 miles of permanent road work, entailing the expenditure of $741,488, already have been approved by the Washington highway commission. Of the total, 15.5 miles will be of concrete; asphalt, 1.5 miles; asphaltic macadam, 11.5 miles; macadam, 7.1 miles; crushed rock, 1 mile; gravel, 75.9 miles. There is $1,000,000 more to the credit of the various counties in the permanent highway fund for which permanent highway contracts may be awarded this year.

Ohio Appropriates Road Funds—By the passage in the senate of the Swan and Reighard bills the financial entanglements of the Ohio state highway department are straightened out so that the department can proceed with the letting of contracts and push to completion such contracts as already have been entered into. The Swan bill reappropriates $1,154,000 of state highway funds, which had lapsed back into the treasury and on which contracts had been let. The Reighard bill appropriates $600,000 to validate contracts which were entered into through error by former Highway Commissioner Marker.

With the Motor Clubs

Seek Quarters for Club—The Spark Club, made up of motor car and accessory dealers of Baltimore, Md., has appointed a committee to look for quarters for the organization. The club probably will have its own clubhouse in the near future.

Ozark Trails Association Meeting—Efforts to secure the improvement of motor roads between St. Louis and Springfield, Mo., will be made by the St. Louis delegation to the meeting of the Ozark Trails Association to be held at Independence, Kan., June 7 and 8.

Chicagoans Make Sociability Run—The Chicago Automobile Club members held their first sociability run of the season May 22. The itinerary included Elgin, Aurora, St. Charles and Naperville, Ill. About twenty-five cars made the run, starting from the club at 8:30 a. m. A set of books was awarded George F. Kelly, who finished first. A. C. Fordham was second and Victor E. Ortland, third.

Advertising Clubs to Meet—Chicago will be the scene of the eleventh annual convention of the Associated Advertising Clubs of the World from June 20 to 24. President Wilson, war conditions permitting, will head the list of speakers, which also includes Hon. W. J. Bryan, John H. Fahey, president of the Chamber of Commerce of the United States, and others of national reputation.

Cheboygan Motorists Form Club—J. C. Rittenhouse has been elected president of the Cheboygan Automobile Club, Cheboygan, Mich. B. C. Jolly is vice-president; C. S. Reilly, secretary, and Leo Edelstein, treasurer. The 1-day old organization set to work at once and started out by appointing a committee to wait upon the aldermen and ask for an appropriation of $75 to cover the cost of grading certain streets for temporary use. Another committee was named to get in touch with the county supervisors concerning the extension of the main stone roads in the county through the city limits.

Club Plans Constructive Work—The Automobile Club, of Kansas City, with a membership of nearly 1,000, is entering upon an important period of its career, with constructive plans for the promotion of good roads, the improvement of city pavements, the dissemination of literature on routes, and the continuation of the club's social features. At a recent monthly meeting a brief statement of the club's activities was made, which aroused enthusiasm for the campaign to increase the membership to a possible 8,000. The organization owns its clubhouse, a 4-story structure of concrete, containing a suit of clubrooms, and garage facilities from which a profit of $2,500 a year is made. The building cost $50,000.

Athens, O.—Lostro Auto Sales Co., to deal in motor cars and operate garage, capital stock $30,000, incorporators, John H. Lostro, F. Dix Preston, John F Lostro, T. T. Wright and Blanche C. Lostro.

Albany, N. Y.—Hoffman Motor Car Co., to deal in motors, vehicles, garages, etc., capital stock $10,000, incorporators, A. D. Friedberg, H. R. Miller, M. J. Neumann.

Albany, N. Y.—Auto Parts Co., capital stock $5,000, incorporators W. H. Reilly, M. M. Hirson, and A. Bertini.

Albany, N. Y.—Roseland Garage, general motor car business, capital stock $25,000.

Annapolis, Md.—Annapolis Garage, to repair, trade in and otherwise deal in motor cars and accessories, capital stock $5,000, incorporators, Ossian K. Mitchell and Clarence A. Beardmore.

Baltimore, Md.—Tire Sales Co., to deal in tires and other accessories, capital stock $5,000, incorporators, Arthur P. Mosby, Carolyn B. Donley and W. F. Kempel Jones.

Cincinnati, O.—Automobile Rebuilding & Sales Co., to deal in motor cars, capital stock $5,000, incorporators, A. A. Heitzemann, William C. Jungelass, Frank Kirgen, R. E. Morrison and J. A. Buccemin.

Columbus, O.—Automobile Tank Mfg. Co., capital stock $50,000, incorporators, Frank E. Shaw, Cecil M. Keran, William F. Shaw, and Thomas J. Croak.

Detroit, Mich.—Loveland Co., dealers in second hand and used cars, capital stock $75,000, incorporators, H. B. Loveland, Ralph N. Mariam.

Detroit, Mich.—Waco Shaffer Motor Co., to make and deal in motor cars, capital stock $00,000, incorporators, William A. Schaffer, John L. Orand and Edwin F. Drake.

Dover, Del.—All-steel Motor Car Co., to manufacture motor cars, trucks, etc., capital stock $400,000.

Kansas City, Mo.—General Auto Service Co., capital stock $6,000, incorporators, W. F. Schriber, E. S. Grinham and John W. Scott.

Milwaukee, Wis.—Jefferson Oil Co., to deal in oils, greases, waste, etc., capital stock $15,000, incorporators, John C. Zeman, W. R. Jurack and F. J. Ramler.

North Muskogee, Okla.—Oklahoma Motor Plow Co., capital stock $100,000, incorporators, J. R. Harrs, B. F. Campbell and J. A. Lawrence.

Paducah, Ky.—Foreman Automobile Co., capital stock $50,000, incorporators, S. E. Foreman, E. C. Phelps and T. A. Miller.

Pittsburgh, Pa.—Briscoe Motor Sales Co., to deal in motor cars, capital stock $10,000.

Pittsburgh, Pa.—Grove Automobile Supply Co., to deal in motor car accessories, capital stock $5,000.

Springfield, Mo.—Overland Motor Co., capital stock $10,000, incorporators, Harry W. Diffenderffer, John L. Deffenderffer and David M. Diffenderffer.

St. Paul, Minn.—Jitney Auto Transit Co., capital stock $50,000, incorporators, J. G. Wardell, W. T. Kenny, D. D. Murphy and J. D. Keough.

Syracuse, N. Y.—Mac Mfg. Co., to manufacture lamps, capital stock $50,000, incorporators, F. F. MacLean, E. E. Tilton, B. Wiles.

Trenton, N. J.—Hassler Sales Co., to conduct a general motor car business, capital stock $5,000, incorporators, George A. Warren, Joseph H. Steinhardt, J. M. Steinhardt.

Among the Makers and Dealers

TIRE Company Opens Branch—The United States Tire Co. has opened a branch at Manchester, N. H., in charge of J. P. Haney, formerly of the Boston branch.

Rubber Company President in Shipwreck—Jacob Pfeiffer, president of the Miller Rubber Co., Akron, O., was a passenger on the steamer Byron that was recently beached off St. Kitt's Island, in the West Indies.

Clutch Concern Sold—The Reliance Gauge Co., Cleveland, O., has taken over the Cleveland Clutch Co. and the machinery of the latter will be removed from its plant at Urbana, O., to the new Reliance factory.

Body Maker Adding to Plant—The Troy Mfg. Co., of Troy, O., manufacturer of motor car bodies, is erecting a three-story addition to its plant. The company has a contract to furnish bodies for the Saxon and Regal cars.

Victor Plant to Be Enlarged—The Victor Rubber Co., Springfield, O., has awarded the contract for the immediate erection of another large addition to its plant. The building will be 30 by 180 feet and two stories high.

Ford Assembling Plant Enlarged—The assembling plant of the Ford Motor Co., in Kansas City, Mo., which consists of a three-story building, 77 by 420 feet, will be enlarged through the addition of a three-story structure, 120 by 400 feet. It is estimated that the total expenditure will be about $250,000.

Will Accelerate Tire Output—The Alliance Rubber Co., Alliance, O., which has been making tires on contract for some time, will soon start the tire manufacturing business in earnest. It is planned to employ three shifts of men after June 1. New equipment will be installed at once to take care of the work.

Earnings Gain in April—Shipments of the United States Light and Heating Co., New York, in March amounted to $173,400; and net earnings, after all fixed charges, salaries, and a proportion of interest charges on floating debts, were $8,836. April shipments are estimated at $225,000, and net earnings at $25,000.

Autocar Sales Increase—Sales of Autocars have increased 40 per cent during the last 5 months, according to a statement just made public by the Autocar Co., of Ardmore, Pa. This is the average from all of the Autocar branches and is made up entirely of domestic sales.

Auctioned Motor Car Stock to Detroit—Alfred O. Dunk, president of the Pullman Machine Co., Detroit, Mich., is arranging additional warehouse space for the stock of the Ohio and Crescent motor car companies, which he recently purchased outright at public auction. Mr. Dunk will go to Cincinnati to supervise final shipment of these recent acquisitions.

Leece-Neville New Factory—The Leece-Neville Co., Cleveland, O., manufacturer of electric starting and lighting systems, has purchased a factory building on Hamilton avenue. The various departments, together with additional machinery, will be moved gradually into the new plant without any interruption of the production of the company.

Add to Reo Plant—The Reo Motor Car Co., Lansing, Mich., has decided upon additional buildings to be ready in September. One three-story building, 100 by 250 feet, will be used for assembling and painting chassis; a 50 by 50-foot three-story addition to the engineering building will provide space for testing laboratory and drafting rooms, a pattern vault, a body-designing department and a photograph gallery. These additions are being made primarily to give more room to the men and thus better working conditions.

English Manufacturer in America—Arthur M. Sayer, Birmingham, Coventry, England, an English capitalist and probably one of the largest individual stockholders in the English motor car industry, is now making a tour visiting all the American motor car factories. Mr. Sayer predicts a large market for American products on the continent.

Cole Stands Strenuous Test—In a recent test of a Cole eight, with a seven-passenger load, Holliswood Hill, Glen Cove, Cold Springs Harbor and Centerport hills on Long Island were taken with gearset lever locked in high. Returning with transmission locked in high speed and shifting lever removed, the Cole went the 40 miles, finishing through city traffic in Brooklyn, without stop or gear shift.

Tire Stock System Devised—The Goodyear Tire and Rubber Co., Akron, O., has inaugurated a small-file stock system for dealers, enabling them readily to determine just what tires are in stock. The company is furnishing, free of cost to dealers, a stock record which has been tried and proven in Goodyear branches, and enables the dealer to locate a tire of a particular size without having to pull down a lot of stock.

Continental Enlarges Plant—Additions to the plant of the Continental Motor Mfg. Co. at Muskegon, Mich., have been started and will provide 90,000 square feet of additional floor space. This will make the total of the Muskegon plant 350,000 square feet, or equal to the floor space of the Detroit plant. There are now 3,800 men employed in the two plants. When the Muskegon plant is completed the total working force will be increased to about 4,900 men.

De Luxe Motor Car Packard Creation—Col. C. C. Slaughter, of Dallas, Tex., known as the richest man in his state, has purchased the most costly motor carriage ever turned out of the Packard factory. Col. Slaughter dislikes to use railway trains and a de luxe motor carriage is his chief hobby. His latest car is equipped with every possible comfort, the body designers having exercised their ingenuity in furnishing the storage space and conveniences of a high class city apartment.

Gear Maker Enlarging Plant—The New Process Gear Co., Syracuse, N. Y., is rushing plans for a new five-story factory building to be 240 feet long by 75 feet wide, giving it 90,000 additional square feet of floor space. This is expected to be completed October 1. This is in addition to the new four-story building at present under construction. For the first 4 months of 1915 the company's business has increased 50 per cent, and there is on order machinery totaling in value $150,000 for installation in the new buildings.

Turns Down $14,400,000 Order—Frederick E. Wadsworth, of the Michigan Steel Boat Co. and the Detroit Engine Works, Detroit, Mich., manufacturers of motor car accessories, stationary engines, motor boats and canoes, recently turned down an order for $14,400,000 worth of Mauser rifles for the British government, thereby proving that he had the courage of his convictions, which are that he cannot consistently accept an order for a commodity to be used in killing persons in a war in which this country has no interest. His London agent cabled for permission to close the contract on which there would have been a profit of nearly $7,000,000, but in less than 24 hours Mr. Wadsworth's perspicacious answer, "No," was back in England.

Maxwell Daily Output Grows—The average daily output of the Maxwell Motor Co., Detroit, Mich., for the first 4 months of this year was 250 cars, 150 more than the average daily output from January to April, 1914. The total number of men employed April 30, last, was 6,391, or 2,270 more than on April 30, 1914. During the first 4 months this year, 2,268 men were added to the pay roll.

Motor Truck Company Organized—The Falcon Motor Truck Co. has been organized by A. B. Hazzard, A. B. Malloy, Detroit, and F. B. Houston, Charleston, O., to assemble a light delivery truck. The company, which will be incorporated, has located in the old plant of the Midland Machine Co., Detroit, Mich. The truck, which will sell at $750 with an open express body, has a wheelbase of 106 inches and 56-inch tread. The motor is a four-cylinder block, 22 horsepower, and other specifications follow conventional lines.

Premier Makes Bridal Car—A bridal car is the latest innovation in motor car construction, according to Frank E. Smith, head of the Premier Motor Mfg. Co., Indianapolis, Ind., who has just shipped a specially designed car to Stanley Smith, of Los Angeles. Mr. Smith will be married in a short time and it is his intention to spend his honeymoon motoring. The bridal car is one of the most attractive ever turned out of the Premier factory. It is one of the latest roadster designs, painted white, with red leather trimming.

New Mogul Truck Factory—The Mogul Motor Truck Co., St. Louis, Mo., has purchased a tract, 125 by 187 feet, on Forest Park boulevard, where the erection of a new factory will begin as soon as the architect's plans are completed. Besides manufacturing quarters the new building will contain a storeroom for motor truck parts and accessories, a showroom for the display of finished trucks, machine shops and the general offices of the company. The size and cost of the building has not yet been determined. Grading of the lot already has been started.

Studebaker Shows Gains—Production and sales of Studebaker cars are showing an increase of 50 per cent over 1914. Figures given out by the Studebaker Corp., Detroit, Mich., covering a period of 8 weeks, show that beginning with the week of March 22, and up to May 15, a total of 10,282 cars were made and shipped while during a similar period in 1914, the cars built and shipped totaled only 6,841. The average production and shipments for each of the 8 weeks has been 1,285 cars this year and was only 855 last year, or an increase of 430 per week in 1915.

New Spark Plug Being Made—Dr. F. R. Carson, of South Bend, Ind., is interested in a company which will put on the market in a short time a spark plug different from all others and for which strong claims are made. The new plug will be manufactured in Laporte, Ind. The new alloy resembling platinum and possessing many advantages of that metal at a very much lower cost, forms the points of the plug, which are in the form of half spheres with the convex sides together. It is claimed this gives a larger and more intense spark, and tends to prevent the collection of oil and consequent carbonization.

Brief Business Announcements

COLUMBUS, O.—The McNaull Tire Co. has opened a branch at 81 South Fourth street. B. K. Bell is manager.

Portland, Ore.—The Power Products Co. is the name of a new accessory house just opened by F. S. Henderson and W. E. Rogers.

Columbus, O.—The Orolo Carbon Remover Co. has been organized here for the manufacture of a carbon remover and engine cleaner.

South Bend, Ind.—Nelson J. Riley, assistant treasurer to the executive officers of the Studebaker Co., and connected with the organization for more than 20 years, has resigned.

Atkinson, Ill.—John E. Parson has sold a half interest in his garage to M. M. Everett. They are selling Overland cars and conducting a garage, general repairing, and accessory business.

Detroit, Mich.—A. L. Morehause, who was assistant engineer of the Hudson Motor Car Co., has been appointed chief engineer of the Mutual Motors Co., Jackson, Mich., which makes the Marion and Imperial cars.

New York—W. Mason Turner has been appointed sales manager of the Woodbridge Chemical Co. He has taken offices in the United States Rubber building and established a salesroom and service station at 229 West Fifty-fourth street to handle Air-In-All.

Detroit, Mich.—D. B. Richardson, who represented the Studebaker Corp. several years in Mexico, will sail soon on an extensive trip to South America for the same corporation. For some time he will be located in Buenos Aires, where he will make an active campaign to develop foreign business. The company intends to send representatives to various other countries.

Athens, O.—The Athens Garage Men and Dealers' Association was organized at a meeting of practically all of the garage owners and dealers of this city. The plan is to affiliate with the national organization. Officers were elected as follows: Fred Burke, president; John Lostro, secretary; Dix Preston, assistant secretary, and Ura Butcher, treasurer.

Minneapolis, Minn.—A local branch office has been opened at 33 Eleventh street by the Heinze Electric Co., Lowell, Mass.

Spokane, Wash.—P. W. Lynch and A. Berg have opened a motor car clearing house at 1212-14 Second avenue.

Detroit, Mich.—C. C. Kriedeman has been appointed superintendent of the Standard Motor Truck Co., manufacturer of the Standard truck in Detroit.

Portland, Ore.—C. H. Kepler and J. T. Henry have opened quarters here under the firm name of the Columbia Tire Repairing and Supply Co.

Portland, Ore.—The Power Products Co. is the name of a new accessory house just opened by F. S. Henderson and W. E. Rogers.

San Francisco, Cal.—George Pearson, Jr., formerly the San Francisco Maxwell distributor, has been named as distributor for the Saxon line in the bay counties.

Los Angeles, Cal.—F. M. Headlee, former manager of the Chalmers agency here, has assumed the duties of wholesale manager of the local branch, which covers southern California and Arizona.

New York—Arthur O. Perlitz, formerly with the Electric Vehicle Co., of Hartford, Conn., and the Chicago and Minneapolis branches of the Locomobile Co., of America, is now with Bromfield & Field, Inc., advertising, New York.

New York—Nelson T. Gutelius, formerly advertising manager of the Motor Car Equipment Co., has resigned to take a position as metropolitan distributor of the Stull mechanical starter for Ford cars. Sales offices have been opened at 103 West Sixteenth street.

New York—G. A. Krause, formerly connected with the engineering department of Jeffery-DeWitt Co., has resigned and will take a position with the Champion Spark Plug Co., of Toledo, O., as traveling service representative.

Portland, Ore.—C. H. Kepler and J. T. Henry have opened quarters here under the firm name of the Columbia Tire Repairing and Supply Co.

Cleveland, O.—G. A. Fassnacht, formerly branch manager of the B. F. Goodrich Co. in Toronto and Omaha, is now manager of the Sixth City Tire Repair Co., a new incorporation here.

Los Angeles, Cal.—M. H. Green has been appointed retail sales manager of the local Apperson branch. Green was for six years manager of the Cadillac, and three years sales manager of the Hudson agency here.

New York—E. S. Huff, formerly connected with the Maxwell Motor Co., Detroit, Mich., has joined the Simms Magneto Co. and will work on the development of starting and lighting systems.

San Diego, Cal.—Announcement is made that H. H. Eitzen has been appointed manager of the San Diego branch of the Savage Tire Co. He was with the Goodrich company for several years and previous to that time was engaged in the tire business in Idaho.

Sandusky, O.—Fire starting from an explosion destroyed the Caswell garage, containing more than forty machines. The loss is $120,000. Two tourists who tried to save their cars entered the garage and have not been seen since.

Minneapolis, Minn.—The Hyatt Roller Bearing Co., Detroit, Mich., has established an agency here, in charge of N. S. Swan, of Boston, who will have control of territory embracing Minnesota, Iowa, North and South Dakota and Montana.

San Diego, Cal.—M. L. O'Brien has been appointed assistant to Claus Spreckles, secretary of the Savage Tire Co., of this city. O'Brien is an experienced rubber man on the coast, having served with the Goodrich company in California for the past 4 years. He began his career in Akron, O., with one of the large rubber concerns.

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Aberdeen, S. D.	Wells Motor Co.	Paige-Detroit
Akron, O.	Akron Taxicab Co.	Reo
Alliance, O.	L. J. Carson	Chalmers
Auburn, Me.	Saxon Motor Co.	Saxon
Bakersfield, Cal.	Roscoe E. McCabe	Chalmers
Bakersfield, Cal.	W. F. Goudy	Grant
Baltimore, Md.	John N. Stuart	Reo
Berrien Springs, Mich.	Edison Bros.	Saxon
Chancellorsville, W. Va.	Jefferson Garage	Franklin
Cleveland, O.	The Gholson Auto Co.	Sphinx
Cincinnati, O.	Eureka Auto Co.	Hollier
Cincinnati, O.	Eureka Auto Co.	Grant
Columbus, O.	Daniels Motor Car Co.	New Era
Columbus, O.	Hilane Garage	Jeffery
Columbus, O.	Gott & McKelvey	Pullman
Chillicothe, O.	W. D. Mallow	Apperson
Carlinville, Ill.	H. C. Daley	Saxon
Cheboygan, Mich.	Vet S. Maloney	Crow
Crewe, Va.	MacTavish Motor Car Co.	Saxon
Carmel, N. Y.	E. Fowler Auto Co.	Saxon
Charleston, W. Va.	E. R. Calloway	Saxon
Cowansville, Que., Can.	Gordon Pickel	Saxon
Clarksburg, W. Va.	Monticello Automobile & Garage Co.	Saxon
Chatham, Va.	Southside Automobile Co.	Saxon
DePere, Wis.	McGeehan Sons Co.	Apperson
Dearborn, Mich.	Joseph Kott & John S. Wright	Saxon
Delaware, O.	Howard Lennox	Apperson
Denmark, Me.	C. E. and A. P. Cobb	Saxon
Evansville, Ind.	Beverly Cycle Co.	Saxon
Fresno, Cal.	J. C. Phelan	Oldsmobile
Freehold, N. J.	Freehold Motor Co.	Saxon
Greenville, Miss.	Chas. A. Ehlbert	Saxon
Gaylord, Mich.	Gaylord Auto & Repair Co.	Saxon
Hoosick Falls, N. Y.	Phoenix Garage	Oldsmobile
Janesville, Wis.	J. A. Strimple	Saxon
Kenton, O.	Ed Rose	Saxon
Kenney, Ill.	W. M. Myers	Premier
Kirkersville, O.	H. S. Thompson	Apperson
Louisville, Ky.	Motor Sales Co.	Saxon
Louisville, Ky.	Louisville Auto Exchange	Detroiter
Little Rock, Ark.	Thos. Cox & Sons Machinery Co.	Oldsmobile
Logan, W. Va.	E. R. Mullins	Saxon
Lyerly, Ga.	Doster & McKoy	Saxon
Marshalltown, Ia.	George D. Brown & Son	Oldsmobile
Milwaukee, Wis.	Creek Motor Sales Co.	Inter-State
Milledgeville, O.	E. L. Fichthorn	Apperson
Morganfield, Ky.	Young & Russell	Saxon
Marine City, Mich.	J. C. Bell	Saxon
Newark, O.	Chas. U. Stevens & Son	Reo
New Haven, Conn.	Atwood Automobile Co.	Saxon
Oklahoma City, Okla.	Knox Auto Co.	Regal
Port Huron, Mich.	Port Huron Tire & Repair Co.	Cole
Paragould, Ark.	J. L. Thompson	Saxon
Pittsburgh, Pa.	Pittsburgh-Merce Auto. Co.	Premier
Perth Amboy, N. J.	Perth Amboy Garage Co.	Saxon
Portland, Me.	Portland Saxon Co.	Saxon
Red Bank, N. J.	F. H. Van Dorn Auto Co.	Saxon
St. Paul, Minn.	Joswich Mfg. Co.	Chandler
San Bernardino, Cal.	Damon Cooley	Grant
Stamford, Conn.	The Mechalay Auto Co., Inc.	Saxon
Springfield, Mass.	Saxon Springfield Co.	Saxon
Sullivan, Me.	H. L. Cleaves & H. W. Dunbar	Saxon
Springfield, Ill.	The R. Haas Electric & Mfg. Co.	Saxon
Sussex, N. J.	Sussex Garage	Saxon
Sault Ste. Marie, Ont., Canada	Drew & Johnson	Saxon
South Bend, Ind.	F. N. LaBadie	Saxon
Syracuse, N. Y.	Hugo Brugmann	Saxon
Towanda, Pa.	George W. Coolbaugh Co.	Saxon
Tempe, Ariz.	W. H. Strong	Case
Tupelo, Miss.	D. A. Harkey	Saxon
York, Pa.	Snyder Automobile Co.	Cole
Welch, W. Va.	S. J. and J. W. Kell	Franklin
Washington, D. C.	Davis S. Kendrick Co.	Saxon
Washington, D. C.	Davis S. Hendrick Co.	Franklin
Warsaw, Ind.	Coleman Garage	Saxon
Windsor, Ont., Canada	Spracklin Bros.	Saxon

COMMERCIAL CARS

Town	Agent	Make
Columbus, O.	Daniels Motor Car Co.	Stewart
Lexington, Mo.	Jas. W. Cheatham	Koehler
Memphis, Mo.	W. C. Chew	Koehler
Marshall, Mo.	P. H. Rea Garage	Koehler
Milwaukee, Wis.	Arhelger Truck Co.	Standard
Pensacola, Fla.	W. G. Porter	Koehler

The Motor Car Repair Shop

Instructions for Painting the Car Yourself

UNLESS the amateur is willing to undertake a job which depends for its value upon the care and hard work put into it, he is advised to give up all ideas of painting his car himself. It is a hard thing to do well and requires considerable time if a presentable appearance is to be given the machine. When it is realized that even the motor car factory turning out high-grade cars usually allows about 2 weeks or even more for the painting operations, and that in some instances as high as eighteen or more operations of applying paints and varnishes and then smoothing them off with sandpaper or rubbing stone, are required to finish a body, then the painting problem looks quite large.

But, as the average motorist has a very vague idea of just what is done to attain a mirror-like surface, or even one which is not in the mirror class, he either goes at the work over-confident or is afraid to tackle it. It is best to be fully aware of the difficulties that stand in the way of a good finish, and if willing to take the trouble, then to go ahead. It is certain that a very good job can be done, for skill at the work is not an essential, and as labor is the main item of expense in having the work done by a professional painter, much can be saved by doing the work in the garage.

Many cars which have been considerably weathered so that the finish is dull can be put in excellent condition without removing any of the old paint by simply applying the new over it. The reason the factory applies such a large number of coats to the new body is to get a smooth surface to work on. After this is once attained it will last, providing no scratching or chipping of the paint has been done. So the foundation is laid and it is only necessary to brighten it all up with the few new coats.

Treating an Old Body

However, if the old paint is in very bad condition and is rough so that it would be foolish to try to make a smooth and good looking job without removing it, then the best thing to do is to either burn it off with a blow torch or to use one of the paint removing specialties on the market. The blow-torch method is not advised for the inexperienced, as disastrous results might follow the improper handling.

Varnish removing preparations are applied with a brush to the old paint. After one or two applications, the old paint should come off readily with the aid of a putty knife or other similarly-shaped tool. This should leave the wood surface free of any paint whatever. Next sandpaper the whole surface very carefully. While doing this work fill any cracks or holes with putty—a special grade recommended by the paint supplyman should be used. This putty will dry over night, and then the next day it can be sandpapered down to a smooth surface along with the body as a whole.

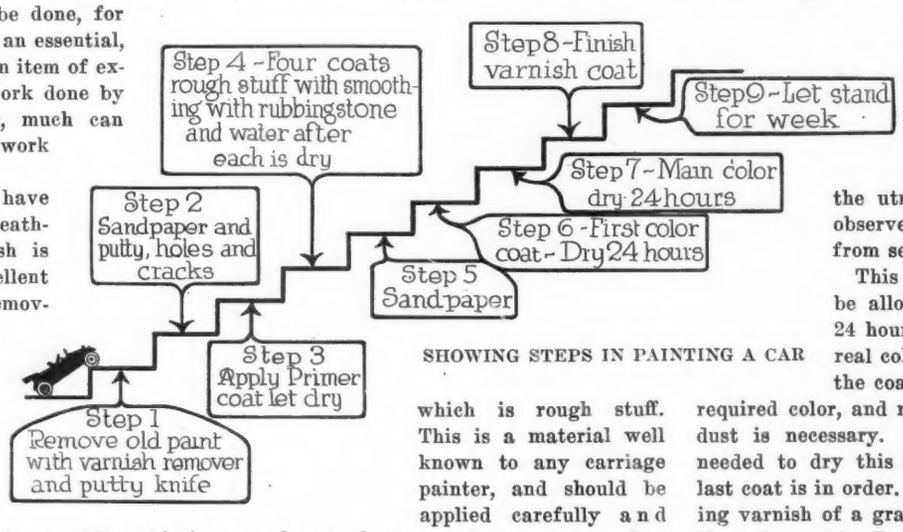
Having made sure that the wood is as smooth as it is possible to get it, then wipe off any dust or other dirt carefully, and apply the first coat of paint. This is known as the primer coat, and is a composition with lead in it. All paint specialists know what kind of wood primer is required for this work, and no trouble should be experienced in getting it from dealers that know the business.

Following this, there should be four coats of a filler, the common name for which is rough stuff. This is a material well known to any carriage painter, and should be applied carefully and evenly at the rate of one coat a day. Where a man has to do the work at odd times, it is a good plan to apply a coat of rough stuff at night, and then wait until the next night to do the rubbing and putting on of the next coat. After each coat is dry, it must be smoothed off by rubbing with a rubbing-stone and water. This stone is a common article in painters' supply stores. The surface will have a very smooth and slate-like appearance after these rubbing operations are finished.

It is advisable next to sandpaper carefully the whole job, using a fine grade of sandpaper. The condition of the body now is practically the same as regards smoothness as the car would be that already had the smooth foundation of the old paint and was ready for the new finish without removing this old paint.

That, is from this point forward the work is the same whether it is a car with the original smooth paint simply dulled or weathered, or one on which the smooth foundation had to be remade by removing all paint and starting all over again in the manner just described. The only thing is to be sure the old paint, if it is not removed, is free from abrasions or rough spots where the paint has been scratched off. These should be touched up with some of the first color coat, which is next to be applied all over. Putty any cracks or holes, sandpaper the touched-up spots and puttied places; let this preparatory work stand over night, and then the car is ready for the real color painting.

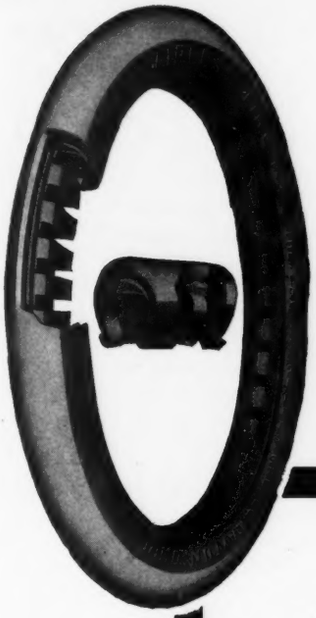
The worst part of the work is now over, and to complete the job it is only necessary to apply about three more coats. The first of these is intended primarily to form a suitable ground for the color desired. It must be a mixture that will properly stick to the old paint or to the newly-prepared smooth surface, as the case may be; in short, a preparative for the real color coat. It must be applied carefully and smoothly, and the utmost caution must be observed to prevent dust from settling on it.



SHOWING STEPS IN PAINTING A CAR

This first color coat should be allowed to dry for about 24 hours before applying the real color coat itself. This is the coat that gives the actual required color, and no less caution against dust is necessary. Another 24 hours is needed to dry this coat, after which the last coat is in order. This is a clear finishing varnish of a grade suitable to go with the color used. It will dry hard enough in about 24 hours so that dust will not adhere to it, but under no circumstances should the car be used that soon. It should be allowed to stand for 1 week before it is run. This gives the varnish time to set properly, and later use then will not crack it.

Sometimes, when a specially fine surface is wanted, a coat of rubbing varnish is put on after the main color coat and before the application of the finishing varnish. This rubbing varnish is usually applied only to the large surfaces such as side panels, doors, and back, and its only advantage is to obtain an even smoother finish and is not worth while unless the owner has plenty of time.



The Advance Guard *of the* Prosperity Wave

DAYTON AIRLESS TIRES

which the foremost business men—economists and statisticians—so confidently forecasted, is here. Each day brings news of fresh activity, of some industry resuming operations, or of new millions infused into the marts of trade.

Are you prepared to reap the reward which this opportunity offers?

How about your stock of TIRES—the very heart of the accessory business.

Are you selling a tire which is delivering satisfaction? Investigate the DAYTON AIRLESS TIRE and be prepared.

This tire cannot puncture, nor blow out—you have no money invested in extra casings, no inner tubes, no monthly repair bills—no troubles or delays on the road. Think what this means to the motorists and what it means in sales to the dealer.

Write us today and let us explain one of the best money-making propositions ever offered.

The Dayton Rubber Mfg. Company
1005 Kiser Street **DAYTON, OHIO**

YOUR CAR, SIR

Represents your personal judgment—whether as its owner, or as the dealer who sells it, or as the maker who builds it.

Its capacity for pleasure-giving **service** depends upon the **service capacity** of the units which, combined, make up your car. The **service quality** of these units, then, concerns you vitally.

The magneto, the lighting generator, the starting motor, for instance—your engine runs right only as your magneto runs right—your lights are dependable only as your generator is dependable—your car starts properly only as your starting motor does its duty.

As owner—or as dealer—or as builder—run over in your mind the names of the magnetos, generators and starting motors that you **know** stand for **maximum service capacity.** Then—

Ask the makers of these accessories what bearings they use. The answer, almost without exception, will be

"NORMA" BALL BEARINGS

Accessory manufacturers who build their reputation into their magnetos, generators and motors—use "NORMA" Bearings.

Car manufacturers seeking to give maximum service capacity to their cars—use "NORMA"-equipped electrical accessories.

Dealers discover that the cars with the greatest demand among discriminating buyers—carry "NORMA"-equipped accessories.

Owners find that the cars that give them the most satisfactory service—have "NORMA"-equipped accessories.

In fact, "NORMA"-equipped electrical accessories have come to be one of the features which distinguish the car of maximum service capacity.

As accessory manufacturer, then, why not put **your** apparatus in the "standard" class by using "NORMA" Ball Bearings?

As car builder, why not add to the popularity of **your** car, make its sale easier, by standardizing on "NORMA"-equipped magnetos, generators and motors?

As car dealer, why not insist upon "NORMA"-equipped accessories in the line of cars **you** handle?

As car owner, why not demand "NORMA"-equipped accessories as the electrical equipment of the car **you** buy?

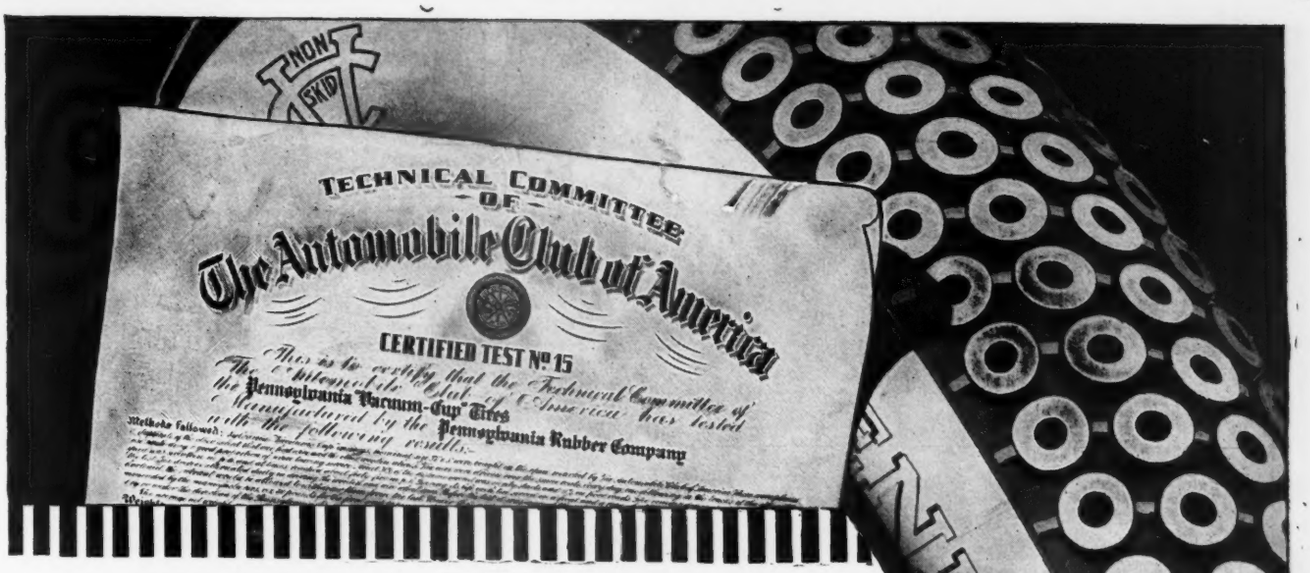
We will send on request a list of electrical automobile accessories using "NORMA" Bearings. You will recognize the names as those of the leaders.

THE NORMA COMPANY OF AMERICA

1790 BROADWAY NEW YORK

"NORMA"

Ball, Roller, Thrust and Combination Bearings



Outstanding factors which enable dealers to meet conditions more advantageously than ever with Pennsylvania Oilproof

VACUUM CUP TIRES

First—the very moderate differential in price that now prevails between these and ordinary tires; made possible by the operation of our great new factory.

Second—the actual 50% increase in wear resistance which we have effected on 1915 V. C. Tires. This—remember—is over and above the quality that scored the unaproached average mileage of 6,760 miles in the 1914 Official test by The Automobile Club of America—covered by the famous Certificate No. 15.

Third—with the new increased wearing quality the absolute and guaranteed anti-skid efficiency takes on even increased importance. Absolutely Oilproof, as ever, of course.

The V. C. Dealer has more than ever in his favor for going after the high class trade

Pennsylvania Rubber Co. - - Jeannette, Pa.

Direct factory branches and service agencies throughout the United States and Canada

An Independent Company with an Independent Selling Policy

OAKES

HORN-FAN-PUMP

$12.50

ALL THREE IN ONE

Beartone for FORD CARS

Oakes	
Fan-Horn-Pump	$12.50
Fan-Pump	7.50
Fan-Horn	5.00

This combination is as efficient as it is simple. It gives you a highly efficient fan—a strong lusty horn, and a **real** tire pump—all three in one. Pump works only when needed to inflate tires. To attach, remove old fan on your Ford and put this Oakes in its place—easily done in ten minutes. No special gears or fittings required—no holes to drill—you don't even have to remove cover on crank case housing. To operate pump, merely press lever which engages gear on pump with the gear on fan.

Pump—Single cylinder 1½x1¾, of finest gray iron. Pistons fitted with ground piston rings. Perfect lubrication. No crank shaft. Worm gear drive—bronze connecting rod. Grease cup on bracket permits oiling of fan while fan is in motion.

Every detail is of finest design, workmanship and material. The name "Oakes" guarantees its superiority.

Write for Lucrative Dealers' Proposition.

Speedway Visitors

We want to meet you while in Indianapolis for the Speedway Races. Visit our factory. See for yourself how we build quality into every Oakes product. Get acquainted with the money-making advantages and widespread success of the Beartone. Write or wire us when you will be there and we will meet you.

OAKES

The OAKES Co.
Indianapolis, Ind.

Canadian Branch:
Beartone Mfg. Co.
Berlin, Ontario.

The Oakes Fan-Horn, Selling for $5,

is simple, safe and durable. Gives any volume or range of warning signal needed. Press button at driver's seat—that's all. Instant response—never fails. It is motor driven, an integral part of the cooling fan. **Not** an electrical horn. No gears, batteries, wires, or complicated mechanism. Oakes fan is best—outwears the car. The fan itself actually increases efficiency of motor, saves oil and gasoline, by pulling more air thru radiator.

National SPECIAL RED TUBE

Extra Thick—Extra Tough—More Elastic

Guaranteed Non-porous and proof against deterioration

You have often heard the expression "Special made racing tires"—tires built to withstand terrific strain and abnormal wear? Here is a "special made" tube—one that is built to give uninterrupted service for *years* and to be absolutely proof against slow leaks, deterioration and decay.

Guaranteed for one year against deterioration or decay

The National "Special" Red Tube is built entirely by hand of the *finest* Rubber Stock—Upriver Para. We could buy ordinary *good* rubber for one-third the price we pay for this *selected* Para. But the result obtained from this more expensive stock is well worth the added cost.

For One Thing We Obtain Toughness

A section of this National "Special" Tube measuring an inch wide and four one-hundredths of an inch thick, after it has been treated with our special vulcanizing process, has a tensile strength of 900 pounds. The *ordinary* good rubber would have a tensile strength of less than 500 pounds.

For another thing, we obtain elasticity. The rubber in a National "Special" Tube will stretch to nine times its own length. It would be possible to use a 30x3 National "Special" Tube in a 37x5 tire without injury to the tube.

But it is not alone fine rubber that makes National "Special" Tubes better.

Made Extra Thick

National "Special" Tubes are built of many thin sheets of rubber gum—*by hand.* This is to make the tube non-porous—to eliminate all the small holes and air bubbles—to eliminate the possibility of the development of slow leaks after the tube has been in use for some time.

Then the tube is built *thick*—thicker than any other tube you have ever seen. You will never have trouble with the valve patch—*for there is no valve patch.* The valve is vulcanized into the Tube—not pasted in.

Best to Buy—Best to Sell

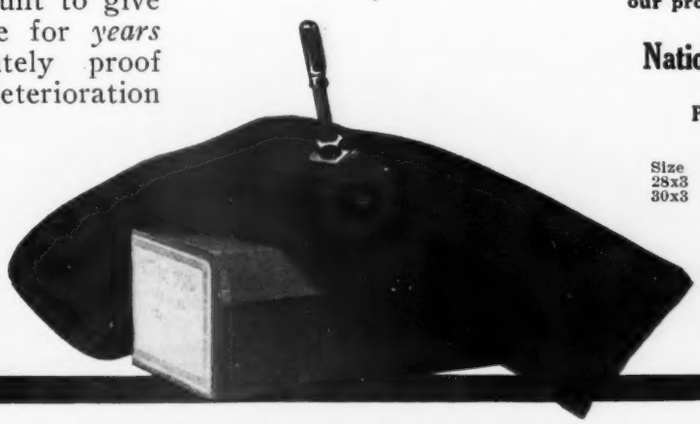
We are making "special" tubes for people who want the best because the best is cheapest in the long run.

Many tubes may sell for less but they are made of cheaper materials and cheaper workmanship and are expensive at any price—either to buy or to sell.

National Dealers have exclusive and protected territories. Write for our proposition.

National Rubber Company

Factory and Main Office
POTTSTOWN, PENNA.



Size	Price	Size	Price
28x3	$3.10	36x4	5.90
30x3	3.20	37x4	6.10
30x3½	4.10	34x4½	7.10
31x3½	4.25	35x4½	7.25
32x3½	4.40	36x4½	7.50
34x3½	4.70	37x4½	7.75
36x3½	5.00	35x5	8.50
31x4	5.20	36x5	8.70
32x4	5.30	37x5	9.00
33x4	5.50	39x5	9.50
34x4	5.65	37x5½	10.30
35x4	5.75	38x5½	10.50

The Stewart Institution has

---everyone using a Stewart

What This Means to the CAR MANUFACTURER

THE motor buying public was long ago convinced that a car is "NO BETTER THAN THE POOREST ACCESSORY on it."

The best made car on earth equipped with "just-as-good" or "next best" accessories, will miss many a sale if the quality of its accessories is skimped on.

There is no other product that ALL MOTORISTS use so universally or know so favorably as Stewart Products.

They are used every day on the cars of 1,700,000 Motorists who have become steadfast friends of Stewart Products because their experience has taught them the value of Stewart PRESTIGE, Stewart QUALITY, Stewart SERVICE and Stewart SATISFACTION.

When these same Motorists are again in the market for a car they are surely going to look for the well-known Stewart Products that gave them such wonderful satisfaction on their former car. They are going to look with suspicion at the car that carries unknown accessories. The car and its accessories must be in harmony.

Confidence is built up wonderfully fast in the prospective BUYER when he looks over a car and finds it equipped with the best known speedometer—the Stewart; the best known warning signal—the Stewart: the best known tire pump—the Stewart: and the ideal Gasoline System—the Stewart.

It is the duty of every car manufacturer to make his car as nearly 100% "criticism proof" as possible thus saving his Dealers CONSTANT EXPLANATIONS, and many LOST SALES.

Why should YOU do the advertising of UNKNOWN accessories at the expense of your sales volume?

What This Means to the GARAGE MAN

THE live garage man in every community all over America long ago realized that Stewart Products are in greatest demand and easiest to sell of any automobile accessories. He learned that the public has practically stampeded to Stewart Products. The name STEWART is the one name known by car owners above every other in the automobile accessory world.

To make a sale of any Stewart Product it is not necessary to go into long explanations, because practically every car in your garage is equipped with one or more Stewart Products, and every customer on your books already knows the Prestige, Quality, Service and Satisfaction that go with every Stewart Product.

Why spend your valuable time trying to sell one of your customers an unknown warning signal, when you can make a quicker sale of the Stewart Warning Signal at just as much, if not MORE, profit to you, and make a SATISFIED customer who is going to come back for MORE supplies because he has confidence in what YOU sell?

Stewart Products practically sell themselves and make you a big, regular profit all the year round.

Never miss an opportunity to bring Stewart Products to your customers' attention.

Stewart Warning Signal

The fastest selling and most popular warning signal ever manufactured. Has educated the public as to the importance of a proper warning signal to make automobiling absolutely SAFE. It has convinced motorists that the hand-operated signal is unquestionably the only safe signal to carry. It is "always on the job." 2000 being sold every day.

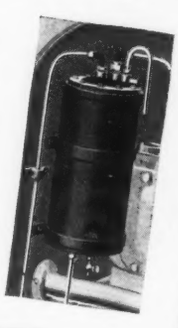
$5

Stewart Vacuum Gasoline System

Granted to be the greatest boon that has come to the automobile industry in recent years. Makes the automobile of today complete, because it assures for the car the first absolutely automatic, even feed of gasoline to the carburetor.

$10

Already regular equipment on 92 popular makes of cars. Over 100,000 in use today.



1,700,000 loyal supporters

Product on his car every day

What This Means to the

CAR DEALER

THE car manufacturer expects you, the dealer, to sell a certain number of his cars in your territory. Your success and the car manufacturer's success depends upon your accomplishing this, and you often have to accomplish it against tremendous odds.

You have competitors all around you—almost every one of them selling a GOOD car, perhaps just as good a car as the one you are selling, and in some cases it may be a better car.

If your car manufacturer **HANDICAPS** you in **ANY** way, you are sure to lose sales, and the **WORST** handicap he can put on you is to expect you to sell **YOUR** friends a car that you **KNOW** doesn't carry 100 cents on the dollar, of value, as compared with other cars that you have to compete with.

The car you sell may be 100 per cent perfect **IN ITSELF**, but if it is equipped with poor grade accessories, because of the **SHORT-SIGHTED POLICY** of its manufacturer, you are sure to be handicapped in sales every day, while the car that is being sold next door, which is also 100 per cent perfect **IN ITSELF** and carries high quality accessories, will justly take sales away from you day after day.

Select the car that you can sell most easily because it carries not only quality in itself, but accessories of well-known standard quality, which inspires confidence with the public in your car. 1,700,000 Motorists **NOW USE** Stewart Products.

What This Means to the

ACCESSORY JOBBER

1,700,000 car owners are RIGHT NOW using one or more Stewart Products.

They could have chosen other products for a similar purpose, but they wanted and insisted on Stewart Products.

They knew that by insisting upon getting Stewart Products they would secure the best Quality that money could buy at any price, and, of equal importance, they also secured Stewart Prestige, Service and Satisfaction.

The car owner who has a Stewart Magnetic Speedometer and wants a Warning Signal is going to buy a Stewart Warning Signal for the same good reason that he purchased a Stewart Magnetic Speedometer—because he has the utmost confidence in what the name Stewart on any product always stands for.

When he wants a tire pump he is going to insist on its being a Stewart Tire Pump, because the name **STEWART** means much to him. He is a **FRIEND** of the **STEWART LINE.**

It will pay the executives of every accessory jobbing house to take these facts into serious consideration and act upon them to our larger mutual profit.

Do not forget that it is easier to sell a man who has one or more Stewart Products than to try to force on him some unknown product which won't give you any more profit and won't give nearly the same satisfaction that Stewart Products always give.

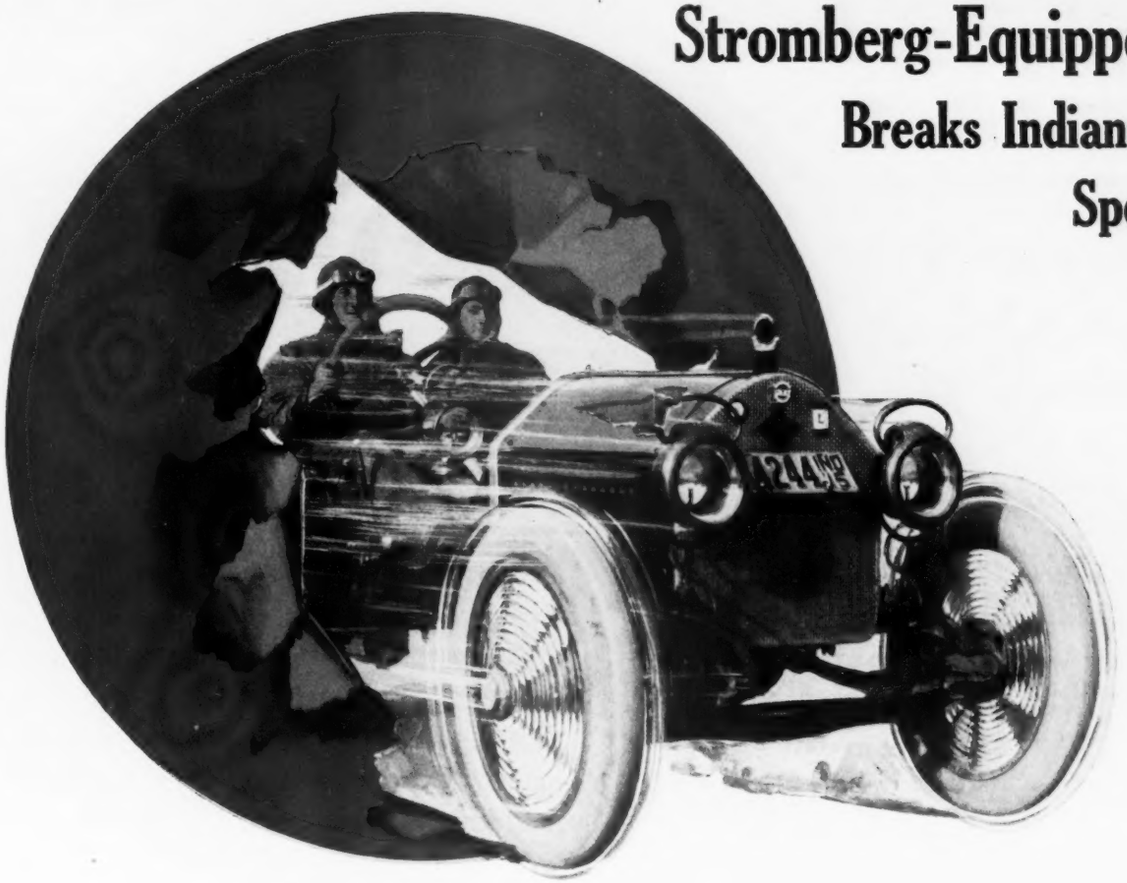
Stewart-Warner Speedometer Cor'n

Executive Offices:
1826-52 Diversey Blvd., Chicago

Factories:
Chicago and Beloit, U. S. A.

15 BRANCHES: Boston, Buffalo, Chicago, Cleveland, Detroit, Indianapolis, Kansas City, Los Angeles, Minneapolis, New York, Philadelphia, St. Louis, San Francisco, London, Paris
78 SERVICE STATIONS IN ALL CITIES AND LARGE TOWNS

Stromberg-Equipped Stutz Breaks Indianapolis Speedway Record



Actually Makes 2½ Mile Lap In 1.31—98.9 Miles per Hour!

Fastest Time Ever Made on Indianapolis Speedway with a Car Under 300 Cubic Inches

Wilcox with his Stromberg equipped Stutz was the big surprise of the season in the official elimination test for the Indianapolis 500-Mile Race—smashed all track records in speed this year for cars this size—actually burned up the 2½-mile lap in 1.31—averaged 98 9/10 miles per hour! The other two Stromberg equipped Stutz Cars also qualified with ease—won big speed records—Cooper's time 1.33—Anderson 1.33½.

This is a Stutz and Stromberg triumph—only the cream of cars qualified this year. The New Stromberg Carburetor used on these cars is the same stock Carburetor used on **all** Stutz Cars. This achievement is **more** conclusive proof of Stromberg superiority—speed—power!

Write us now for new Carburetor information—learn how to improve the service of **your** car, whether new or old. Be sure to state make, model and year of car—and do it **now!**

New STROMBERG Did it!

Stromberg Motor Devices Co., 64 E. 25th St., Chicago

When Writing to Advertisers, Please Mention Motor Age

Every Inch a A NEW LIGHT SIX PAIGE

THE new Paige "Six-36" is the latest addition to a distinguished line of cars—a true Paige every inch of it—a car built to realize an ideal—a car that must not and cannot be judged from the standpoint of its astounding price—$1095—alone.

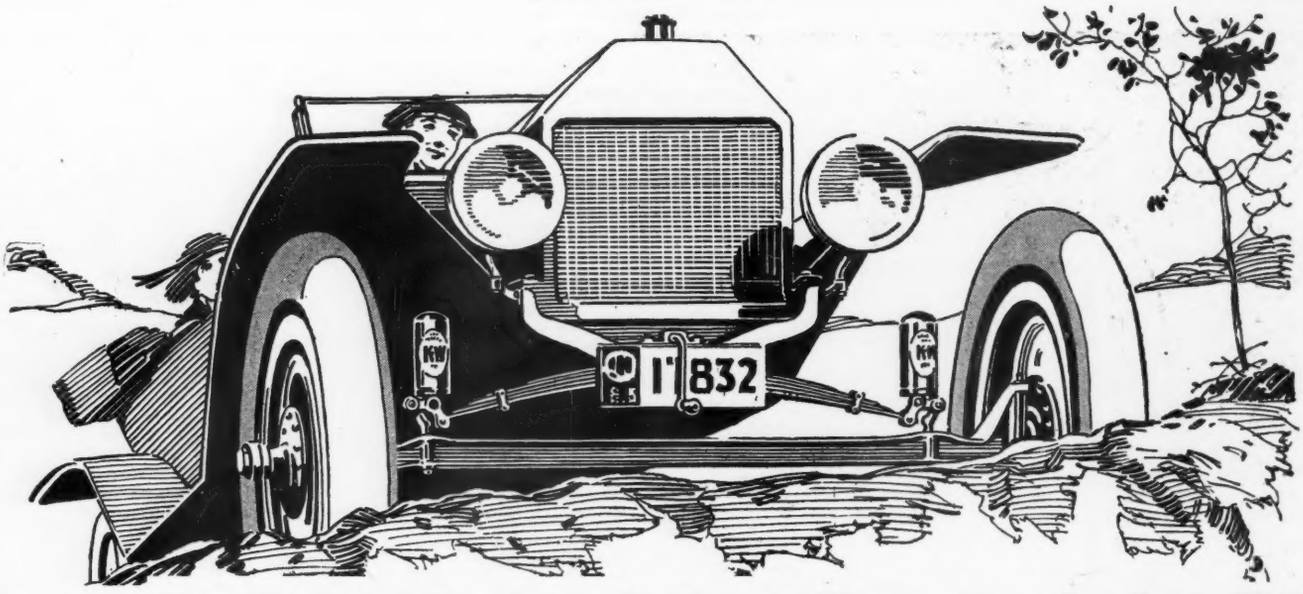
As a motor car dealer you know of your own knowledge the extraordinary success and overwhelming reception of the larger, seven-passenger Paige "Six-46" since it was announced last January. You know undoubtedly that the Paige "Six-46" has proved the most popular, the best-selling, the easiest-selling "Six" on the market. As a motor car dealer you know the American motoring public—which means dealers, owners and prospective owners—has again characterized this Paige "Six-46" as "the world's greatest motor car value."

SIX-"46"
$1395
f. o. b. Detroit

The new light Paige "Six-36" has been made possible by the tremendous success of the "Big Six." It is the logical development of Paige Policy to lead the world in Excess Value. The new light Paige "Six-36" means another year of Paige Supremacy in Value and Quality.

All of the careful manufacturing, all of the painstaking attention to detail, all of the sturdy, reliable qualities which characterize the larger Paige "Six" and have made it the preeminent "Six" of the year will be found in this newer and smaller five-passenger Paige "Six-36."

We are not speculating on next year's sales and production. We KNOW now the Supremacy of Paige Cars. We know the enthusiasm and success of Paige Dealers and the Value of a Paige Franchise to Sell Paige Cars. We know of the Tremendous Demand for Paige Cars. We are doubling the size and capacity of the Paige factory NOW. We shall soon be producing 150 cars a day. The Paige production this coming year will be 15,000 cars. The Paige-Detroit Motor Car Company will next year be the largest producers of medium priced six-cylinder cars in the world. The demand for Paige Cars is breaking all records. But we will meet that demand.



There are Two Kinds of Comfort—Body and Mind—You Get Both With

K-W Road Smoothers

TRADE K-W MARK REG U.S.PAT OFF

QUICKLY APPLIED TO YOUR FORD CAR

They give you the body comfort that comes only from motoring "relaxed" in a smooth riding car—regardless of the road's roughness. They give you mind comfort—that freedom from the tiring effort of steering around bumps and ruts so common to the average road. You are relieved of the nerve-racking tension of "picking the road." You get the same comfort as your passengers, plus the pleasure of "no road worry" driving.

K-W Road Smoothers give you this enviable comfort because their design combines these three vital factors.

1. A spring to effectively take up the shock.
2. An anti-rebound air chamber to check the rebound.
3. Anti-side motion links to prevent side rocking and swaying.

Each of these features is in itself vital to your comfort and safety. It's only when they are combined in one device that you will get the greatest pleasure from your car. Here's how the K-W Road Smoother fills all these requirements:

$15 SET OF FOUR ONE FOR EACH WHEEL

The K-W Spring

A helical spring that effectively takes up the shock, made of electric smelted, chrome vanadium steel. The K-W bracket design allows almost **twice the length of spring action** or "travel" (in actual service) of any other.

The K-W Air Chamber

The anti-rebound air chamber with its smooth fitting piston acts like a door check, and gently "eases off" the rebound of the spring. This is an exclusive K-W feature. Its design provides a strong, tough, self-lubricating piston, working in a dust-proof air chamber. It requires no attention.

The K-W Side Motion Links

Made of the highest grade heat-treated drop forgings of remarkable toughness. This enables them to withstand the great strain put upon them. They prevent your car from pitching, swaying or skidding while making sharp turns.

K-W Bushings

All bearings are phosphor bronze throughout. That means long life.

But you can find all of these vital factors only in K-W Road Smoothers

That is why they lengthen the life of your car, by eliminating shock and vibration. Tire economy is assured, because K-W Road Smoothers enable the wheels (not the whole body of the car) to follow the contour of the road. That means no grinding off the rubber of the tires. K-W Road Smoothers always make good because they are built with characteristic K-W Quality throughout.

But after all's been said and done, it's results that count; and the K-W guarantee covers not only workmanship and material, but **results** as well.

K-W Road Smoothers are quickly and easily attached. No holes to drill and no tools necessary except a wrench. And the final and biggest advantage you get from K-W Road Smoothers is that they increase the radius of your car's usefulness, and bring you home with that "satisfied feeling" after a day of comfortable motoring.

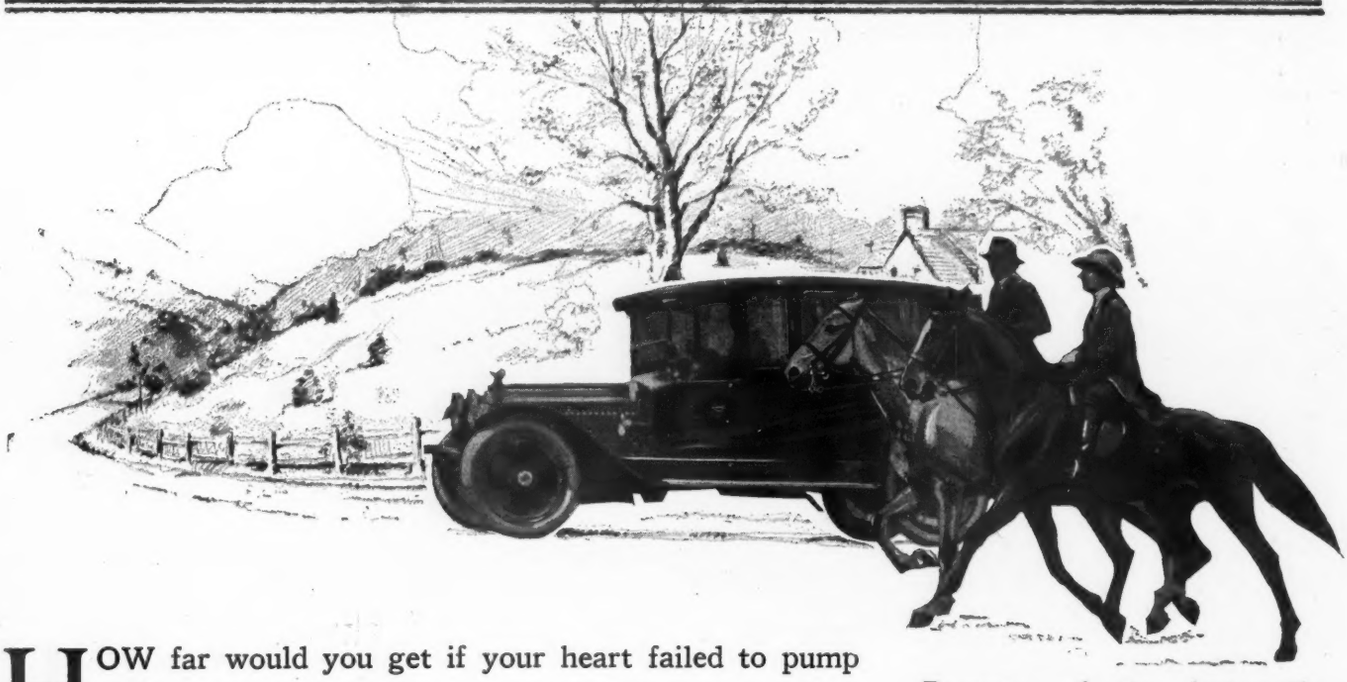
If your dealer can't supply you, sent prepaid upon receipt of price.

Write for booklet "That Satisfied Feeling"

TRADE THE K-W MARK IGNITION Co.
2835 Chester Ave. CLEVELAND, OHIO. U.S.A.

Makers of 125,000 K-W Master Vibrators

Power for the Hills



HOW far would you get if your heart failed to pump added vitality through your body when you undertake to do anything requiring extra effort—climbing a steep hill, for instance?

Just so with an automobile.

If the spark delivered by its ignition system does not furnish added vitality to its motor as the burden of hill climbing increases, then that kind of ignition is far from perfect and way short of the effectiveness of

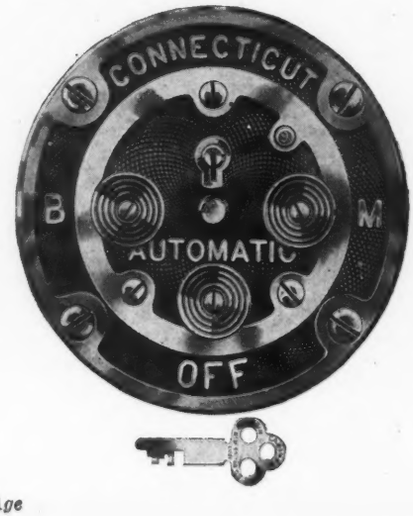
AUTOMATIC · IGNITION CONNECTICUT

In hill climbing—as well as for other conditions of driving—the fact that CONNECTICUT IGNITION automatically tempers the quality of its spark to agree exactly with the requirements of the motor—enables it to respond to the needs of the motor quite as naturally as the heart responds to the requirements of the body.

CONNECTICUT TELEPHONE & ELECTRIC COMPANY, Inc.
MERIDEN CONN.

Because of its Automatic Switch, CONNECTICUT AUTOMATIC IGNITION is able to provide a period of saturation sufficient even at the highest attainable speeds to insure a more powerful spark than the magneto's best effort.

With CONNECTICUT AUTOMATIC IGNITION the saturation period grows as motor speed decreases, so its spark gains intensity as the motor slows up.



ANNOUNCEMENT

Benj Briscoe

I have accomplished a very difficult thing; making a high-grade, beautifully-designed car—standard tread, 4-cylinder, water-cooled motor, semi-floating axle, sliding gear transmission, 5-passenger touring model to sell at $435.00. Roadster at $385.00, fully equipped.

THE ARGO STANDARD

After three years of the most painstaking development work, during which time I have had the assistance of engineers of the highest ability, both in Europe and America, I am now able to offer a high quality, low-priced automobile which I believe to be the most satisfactory and most economical motor car ever offered within a price range of less than $600.00.

In order to prove out certain principles of design and methods of construction, we began with a narrow tread car, putting out through the last few months a large number of ARGO forty-four inch treads.

The splendid results obtained through the use of many hundreds of these cars has been most gratifying and has proven the correctness of the principles of the design and the wearability of the materials and alloy steels used throughout its construction. So now in the

Argo Standard

we offer with entire confidence an automobile that we know will be a most satisfactory one to the user, the motor, transmission, axles of which are made of the highest grade of material; in fact, no car, even the most costly, can have better.

We offer a car which is scientifically designed "Going *with* the forces, rather than the resisting of them" (this is the cardinal principle). In other words, the "major motive" of its design is Flexibility combined with Lightness.

I appreciate that the bringing out of a car to sell at a price hitherto only approached by the Ford (and the Ford is a good car) is a brave thing to do, but even Mr. Ford himself—notwithstanding his great accomplishment in giving to the world low cost, satisfactory transportation—cannot claim a monopoly on all of the designing skill and motorcar intelligence.

The **Argo Standard** is the logical result of the last fifteen years of automobile engineering experience. The car is light, though strong, sets low to the ground, yet has good road clearance.

Back of it is a strong company, a good factory, an efficient organization. Our capacity for the season of 1915-16 will not be over 20,000 cars; and knowing how thoroughly good this car is, we do not think that 20,000 will be sufficient to satisfy the demand—so applications will have to be accepted in the order received.

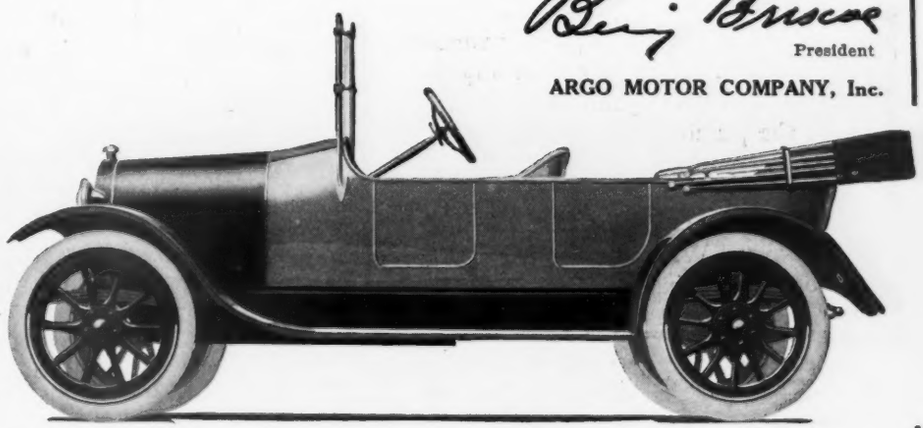
Our selling plan is fair, our contract liberal; in fact, we are "out after business" and our great ambition is to create a dealers' sales organization that will work with us to the end of building up a fair-dealing, an honorable and enduring enterprise.

I am confident that the dealer who obtains the sales rights for this car will have one of the best selling propositions in his locality.

Please don't delay writing, as we must close up territory quickly.

SPECIFICATIONS: **Motor:** 4-cylinder, cast en bloc; 2¾x4½"; three point suspension. **Cooling:** Thermo-syphon system with large flexible connections to standard honeycomb radiator. **Fan:** Powerful steel stamping. **Oiling:** Automatic constant level splash system. **Crank Case:** Aluminum, barrel type with large removable plate on bottom. **Transmission:** Sliding gear, two speeds forward and reverse. **Ignition:** Atwater-Kent timer. **Clutch:** Internal cone type composition faced. **Axle:** Front—"I" beam, heat treated; rear—semi-floating; equipped with Bailey differential. **Drive:** Propeller shaft. **Gears:** Chrome vanadium steel, especially heat-treated and oil-toughened. **Springs:** Full elliptic front and rear. **Brakes:** Service, external contracting; emergency brake on transmission. **Carburetor:** Standard automatic type. **Frame:** Pressed steel ⅛" channel section. **Wheelbase:** 96"; tread, standard; road clearance, 9½". **Wheels:** Touring car, wood; Roadster, wire—clincher rims. **Tires:** 28"x3". **Control:** Single pedal, spark and throttle on steering column: foot accelerator; control lever in center. **Gasoline:** 6 gallon tank, gravity feed to carburetor. **Bodies:** Roadster—2 passenger, fore door; Touring car—5 passenger, fore door; full streamline; Running gear and fenders, black; body, Brewster green. **Weight:** Runabout, 1,000 lbs.; Touring car, 1,200. **Equipment:** Top, top cover, windshield, gas head lamps, gas generator, two (2) side oil lamps and one tail light, tools, tire pump and horn. **Electric starting and lighting system, $60 additional.** All Argo cars for the 1916 season are equipped with the celebrated "Champion" spark plugs.

Benj Briscoe
President
ARGO MOTOR COMPANY, Inc.



ARGO MOTOR COMPANY, Inc., 600 Main St., Jackson, Mich.

One Firm One Service One Guarantee

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

back of every J-M Auto Accessory

THIS J-M slogan carries a double message; one of responsibility, of safety in buying; the other of bigger values through matchless facilities for the marketing of automobile accessories at the lowest cost commensurate with the highest quality of material and workmanship.

3168

LONG HORN

INVENTED BY G.F. LONG

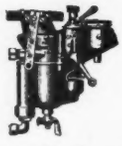
Model "J"

Whoever Hears Must Heed

The voice of the Long Horn is strong. It compels attention. It shouts DANGER at every heedless sleep-walker. It penetrates his inner-consciousness and gets action. This horn is guaranteed to give permanent satisfaction. If at any time any part proves defective, Johns-Manville will give the purchaser a new horn.

Hand operated. No current required. First cost the only cost. Price includes all fittings. Write for booklet and see a Long Horn dealer today.

3134



Carter Carburetor Multiple-Jet

Makes motors more efficient. Saves fuel, gives greater power and insures perfect flexibility. Allows you to throttle down to 4 miles and jump to 40 without change of gears. Prices $17 to $47.50.

J-M Narco Tire-Cut Filler

Combines in one the efficiency of the best cement, cut-filler and mastic. A thoroughly high-grade self-vulcanizer.

J-M Auto Clock

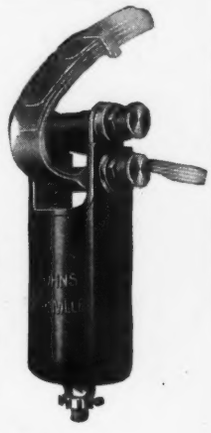
Keeps excellent time. Runs 8 days without rewinding. Setting and winding keys concealed. Finished to match fittings of car. Two mountings, flush or dash, each $5.

J-M Non-Burn Brake Lining

A true safeguard and a real economy. A tough, closely woven fabric with a sure grip. Can be secured in cartons containing cut sizes.

JOHNS-MANVILLE SHOCK ABSORBER

Takes the Thump Out of the Bump



Even if the road is bumpy you can be comfortable. Johns-Manville Shock Absorbers cushion the stiffest spring. They make cars easier-riding.

Per Pair **$15**

A small price for the comfort they bring and it's easily offset by greatly reduced wear and tear on tires and on every automobile part.

Backed by our guarantee for complete satisfaction. Fit springs up to 2¼ inches wide. Adjustable to light or heavy cars and to any load. Easily and quickly attached. Price includes all fittings. Special Spring Perches supplied without extra charge for attachment to Ford cars.

See your dealer today and write us for booklet.

3138

H·W·JOHNS-MANVILLE CO·

Akron, Albany, Atlanta, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Denver, Detroit, Duluth, Galveston, Houghton, Houston, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Milwaukee, Minneapolis, Newark, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Rochester, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Syracuse, Toledo, Washington, Wilkes-Barre, Youngstown

THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED Toronto Montreal Winnipeg Vancouver


National
$1690

82.

Now Ready National HIGHWAY SIX $1690

GO the limit with your praise of this new Six and when you have exhausted your powers of description, seat your prospects in this car and see how easily it will put your claims to shame by its actual performance. Your prospects will be so pleased that they will think you were either over-modest or else tongue-tied. They'll ask—"Why didn't you tell us that it's so smooth-going and comfortable"—and all the time you thought *you* could paint a word picture better than any car ever built.

You cannot say anything too good about this new "Highway Six." Words cannot eulogize this new National any more than to say "Its performance is even better than its photograph."

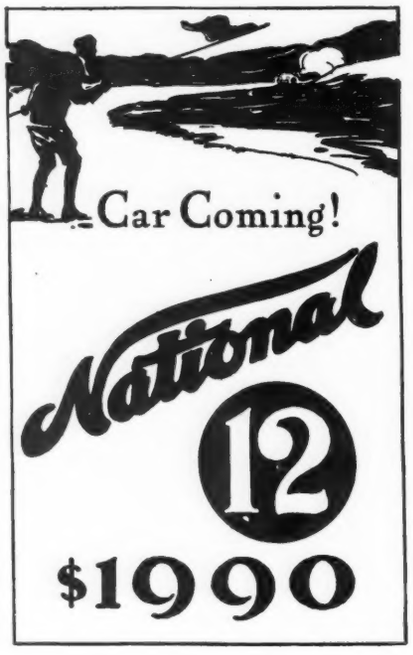
We know what you are thinking—"That the staid, old conservative National Company has changed its policy and is following the example of many manufacturers by resorting to flagrant exaggeration"—but you are all wrong—

We are just as conservative as ever, if not more so. We have built a successful business for fifteen years without making false claims and we don't have to resort to any spasm of adjectives now. With us it is a matter of cold money-making, plain, business sense.

It's a ten to one shot—this new National "Highway Six" at $1690! Heretofore, only one out of every ten buyers who were in love with the National car could afford to buy one—the others had to reconcile themselves to some second choice.

At that we were bought out this year many months ago and could have sold twice our output. This is why we are continuing the successful, powerful $2375 National Six. It is too big a success, too big a money-maker to drop.

But with the addition of the new "Highway Six," ten will buy a National where only one could and did, the past season. The reason for this increase is so obvious that dealers are wiring us for options on territory. If *you* don't, you will wish you had after it is *too late*.



Our capacity is going to be taxed to take care of those who can now afford to buy a National, *building them* in the way *we build cars*. We won't jeopardize the spotless reputation of National by any hurried or slipshod methods. We will build just so many of these cars, only such a number as we know we can build absolutely right. This is a National Policy—proven right by fifteen years of successful car building.

The only question is: Are you going to be one of the fortunate dealers to make money on them? Do not risk a delay. Wire for detailed information and dealers' plan.

National Motor Vehicle Co., Indianapolis

For Fifteen Years Builders of Successful Cars

Nassau

Performance -- Not Words -- Offers Tangible Evidence of a Tire's Worth

We have often told you that NASSAU TIRES were the best tires made regardless of reputation or price; but practically every other tire maker substantially claims the same thing.

To claim to make the best is one thing; to make it is another.

Performance—not words—offers the only tangible evidence of a tire's worth.

It is not a matter of what we say, or others claim.

But What Does Performance Prove?

The record of NASSAU TIRES during the past year has been one of truly remarkable performance. The army of NASSAU USERS who measure the value of a tire in mileage, *per dollar expended*, will unanimously tell you this.

Everybody who saw Ralph De Palma win both the Cobe and Elgin trophies on one set of NASSAU TIRES will vouch for it.

Everybody who saw Bob Burman smashing all the world's dirt track records of from 10 to 100 miles on NASSAU TIRES will tell you **so.**

Everybody who saw Dario Resta at the Panama Exposition win the 400-mile Grand Prix race and a week later win the 300-mile Vanderbilt Cup Race, using the same identical tires in both—NASSAU STOCK TIRES, mind you—will tell you that such a performance has never been equalled in all the history of tiredom.

For it is a truly remarkable thing for a tire to go through even one long race without mishap—

But it is little short of phenomenal for the same tires to go through *two big long distance races without mishap* and still be in good condition.

No other tires have ever equalled such performances—and actual performance, remember—is the only tangible evidence of a tire's worth.

The Speed Kings have found *through actual performance* that regular NASSAU STOCK TIRES endure terrific strain and abnormal wear better than any other tire made.

You will do well to equip your car with NASSAU TIRES. Get acquainted with the NASSAU dealer in your town. You will find him a good man to do business with and he is waiting now to serve you.

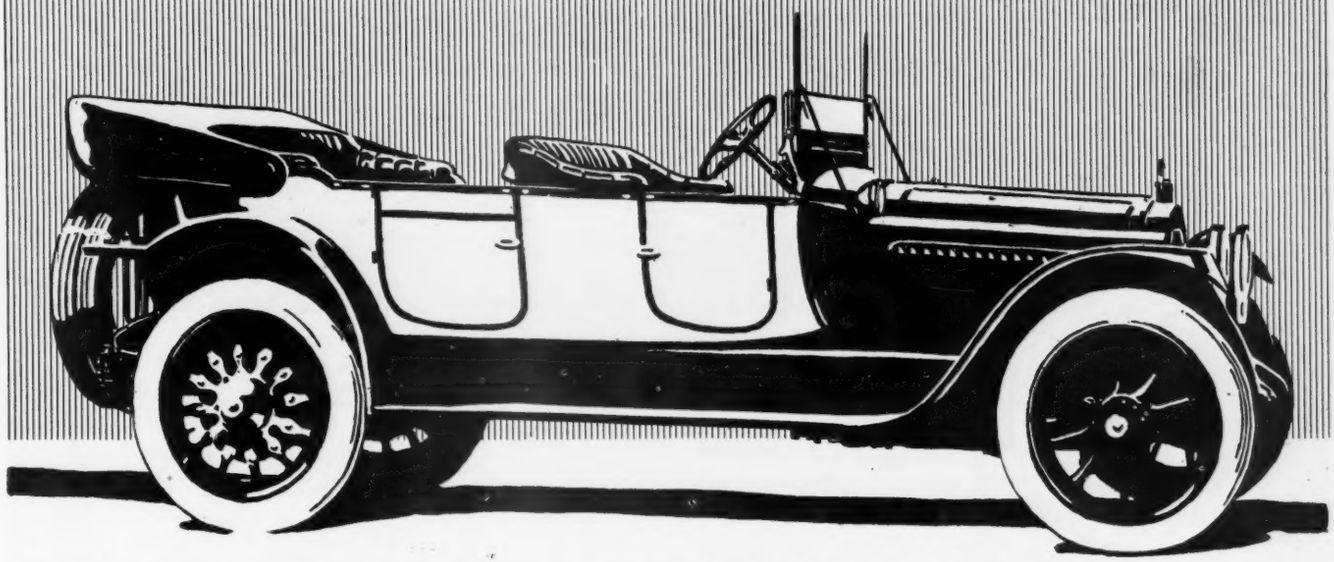
DEALERS: There are a few exclusive territories still open

Thermoid Rubber Company

Factories and Main Offices: Trenton, N. J.

BRANCHES

Chicago, Boston, Philadelphia, Pittsburgh, St. Louis, Indianapolis, Detroit, San Francisco, London, Berlin, Paris.



Announcing the

Packard "TWIN-SIX"

A TWELVE-CYLINDER CAR

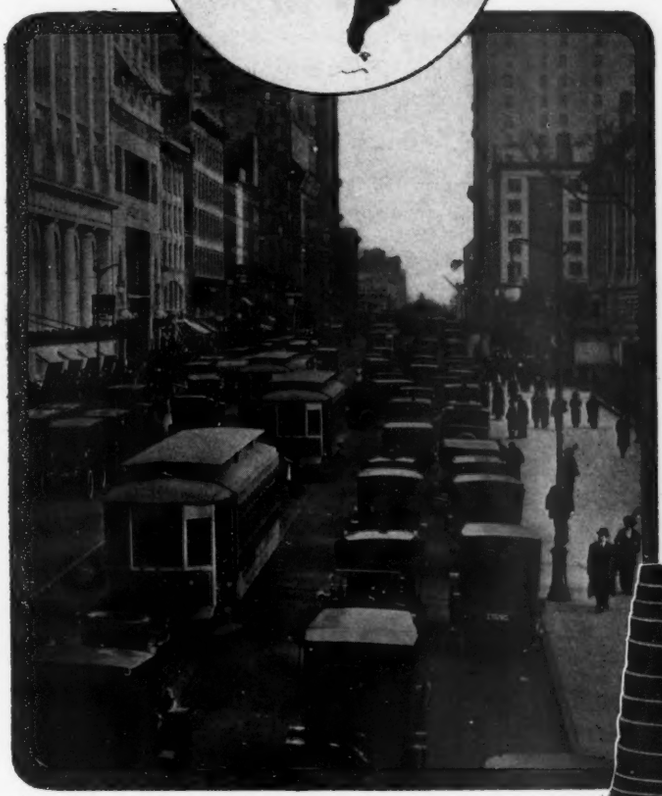
which, by a rapidity of pick-up, a range of high-gear activity, an ease of hill-climbing, a sureness of sustained speed and a nicety of control *never before combined in any motor car,*

recasts every motor car standard and antiquates all the previous ideas of motor car sufficiency

PACKARD MOTOR CAR COMPANY, DETROIT, MICHIGAN

Raybestos

The universal use of this product has made its name the popular term for good brake lining.



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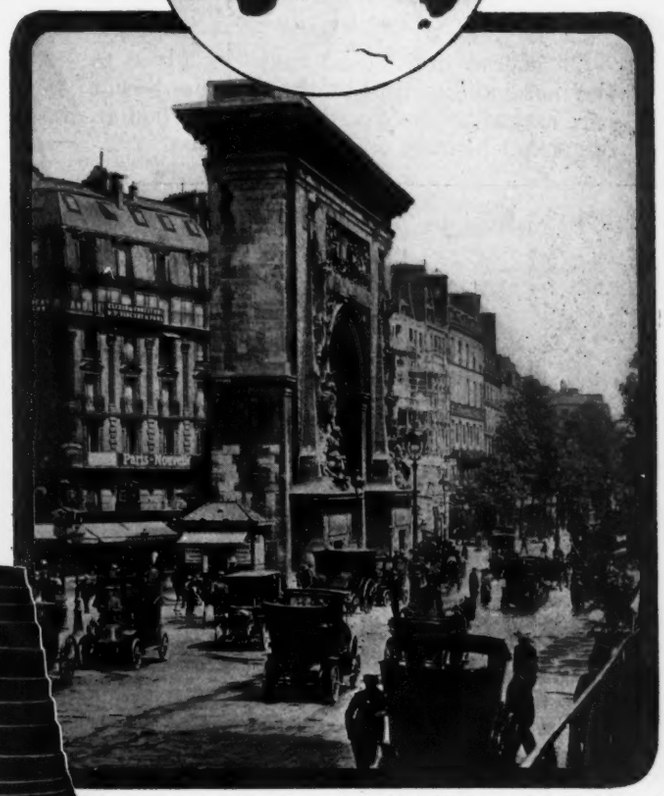
New York City
42nd Street looking East



Copyright, Underwood & Underwood

Paris, France
Scene on one of the Boulevards

Not only is RAYBESTOS used more extensively abroad than the best of foreign made brake linings but its quality and the superb service it gives has done much to wean European designers away from their original preference for metal to metal brakes.

In America non-technical motorists know what you mean when you speak of RAYBESTOS quicker than when you talk of brake lining. Perhaps this is one reason why our trade name as well as our product is so much imitated, but

"They followed me and they copied me, but they couldn't copy my mind,
And I left them gasping and floundering, a year and a half behind."

You can tell the genuine by its silver edges and the trade name RAYBESTOS stamped on every foot of it.

For sale by leading dealers everywhere.

THE ROYAL EQUIPMENT COMPANY

1352 Bostwick Avenue Bridgeport, Connecticut

How He Won Two Ajax Tire Mileage Prizes

Read how this man kept his tire expense down. Besides winning for two successive years the cash prizes which were offered to drivers obtaining exceptionally big mileage this motorist reduced his tire up-keep cost more than 60%. That is, he secured three times the usual average mileage from his tires. Other winners of cash prizes in this tire contest have written us attributing their success to use of Shaler Vulcanizer.

Of course due credit must be given to the make and quality of the tires used—but care and attention given to the tires had an important bearing on their long lives.

NEW YORK OFFICE 88 WHITE ST.

THE BOSTON STORE

CHARLES TRANKLA & COMPANY

Grand Rapids, Mich.
May 7th, 1915

C. A. Shaler Co.,
Waupun, Wis.

Gentlemen:—I just want to drop you a few lines to tell how I made $75 from $3.50. I won the 1913 mileage prize of $50 and last week I received the 1914 prize of $25 from the Ajax Tire Co., both of which I got by using one of your small $3.50 Vul-Kits to keep the small cuts repaired.

Yours truly,
R. Vlas Blom
18 S. Diamond Ave.

This Vulcanizer was bought from one of our dealers and we were unaware that user had it until this letter was received.

Your tires can just as well run from 15,000 to 20,000 miles too. They will run that far if you keep them in perfect condition by sealing the small cuts with a

SHALER Vulcanizer

The Vul-Kit

The $3.50 Investment that paid $75 Dividends

This is the Shaler Vul-Kit, the kind of Vulcanizer Mr. Blom used to aid him in getting his big mileage and win $75 in prizes. Has no exposed blaze. Absolutely safe. Burns gasoline or alcohol—an exclusive Shaler feature. No watching, no regulating. You can't overcure or undercure a repair. Handle always cool. Can be carried in tool box. Anyone can use it. Complete $3.50. Sold direct on receipt of price if you mention dealer's name.

Close up the small holes, the tiny cuts and cracks before sand and water works in. This keeps sand blisters from forming, the fabric from rotting, prevents a blowout and probably a ruined tire.

The Shaler Vulcanizer will repair these small punctures, cuts, tears, holes, rips in casing or tube and will make the repair the strongest part of the tire. It will stop tire trouble and expense, save your tires, save repair bills, increase your mileage and prevent tire trouble by vulcanizing the small cuts and holes.

Free To Motorists!

"Care and Repair of Tires"

Every motorist who is interested in increasing his mileage should have a copy of this valuable tire book. It explains everything about tires. Contains valuable hints and suggestions and shows you how to overcome every kind of tire trouble. Send for a copy today, it's free.

C. A. SHALER CO., 221 Fourth St., Waupun, Wis.

Canadian Distributors
JOHN MILLEN & SON, Limited
Toronto Winnipeg
Montreal Vancouver

REGAL

Which car will you be selling ten years hence?

That inexorable law of the "survival of the fittest" is ever in operation.

Ten years, even five years from now, many different cars will have passed into oblivion.

Outstanding will be a few recognized leaders. The Regal will be one of them.

Hence, we ask, what car will you be handling then?

No matter how attractive today's proposition may be, the farsighted dealer always looks ahead. He computes the probable status of his prospective affiliation, years ahead.

That process of reasoning is one of the fundamental reasons why some men succeed splendidly, while others meet with but mediocre success.

For more than eight years the sturdy Regal has progressed, each year more strongly fortifying its position as a dependable car; each year adding to its hundreds of staunch supporters, because of the service it gives.

What eight years more will bring to the motor car industry can be roughly hazarded. But one thing is sure. The Regal will be in the field, better than ever, abreast of the times, shoulder to shoulder with the leaders, giving utmost service at the right price.

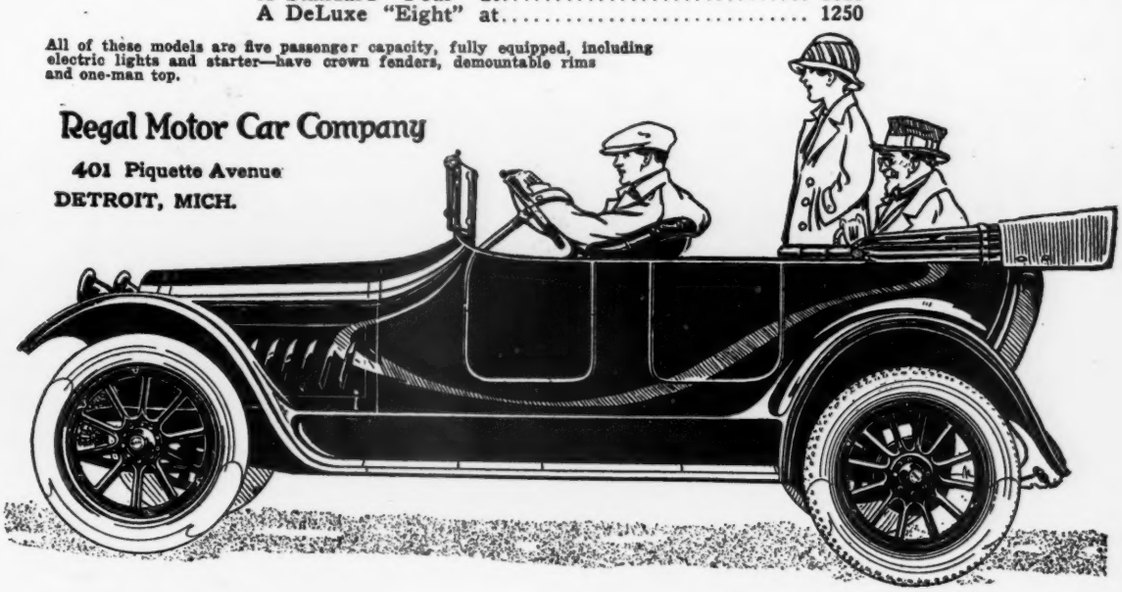
Regal dealers handle and will continue to handle Regal cars year after year, building reputation, gaining friends and *making money*. Here are this year's three splendid Regals:

A Light "Four" at	$ 650
A Standard "Four" at	1085
A DeLuxe "Eight" at	1250

All of these models are five passenger capacity, fully equipped, including electric lights and starter—have crown fenders, demountable rims and one-man top.

Regal Motor Car Company

401 Piquette Avenue
DETROIT, MICH.



KING

EIGHT CYLINDER

"THE CAR OF NO REGRETS"

Dealers

February, March and April averaged a King sales increase 300% greater than the same months last year. The KING "EIGHT" practically sells on demonstration, and stays sold, as Kings always have.

KING advertising is appearing in the street cars of 152 towns and cities the country over. Collier's Weekly, The Saturday Evening Post, and 15 other leading magazines of large national circulation, are a part of our Spring and Summer campaign.

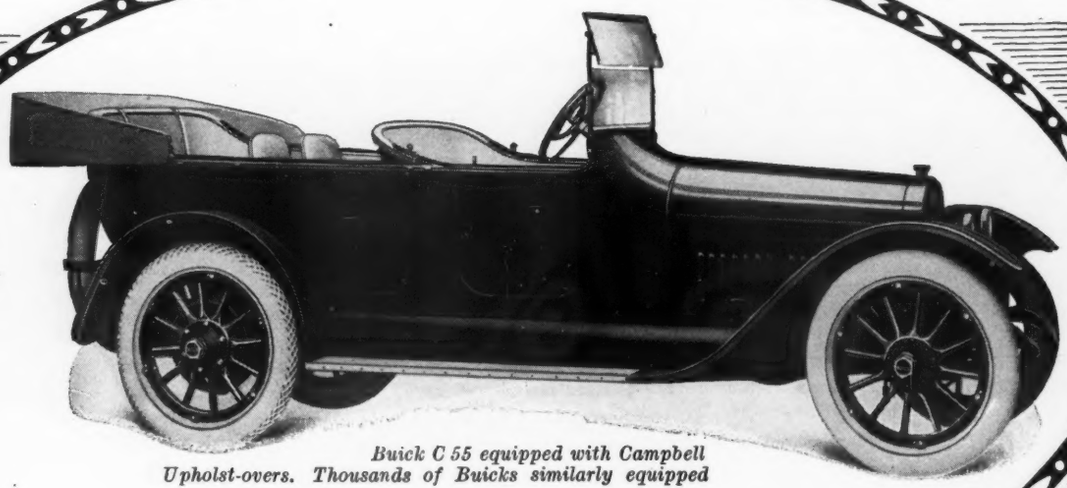
Beginning in June, the 33 leading Farm Papers of the United States will carry big King advertisements. 21 foreign and export journals are also being used. The larger part of the foregoing advertising has been appearing for many months past.

"Cash in" on the "most wanted" car backed by publicity of huge proportions. There's a small amount of territory still open. It may be in your section.

Wire Application Today

KING MOTOR CAR COMPANY, 1300-1324 Jefferson Ave., DETROIT, MICH.

New York Agency and Showroom
Broadway at 52nd Street



Buick C 55 equipped with Campbell Upholst-overs. Thousands of Buicks similarly equipped

Campbell Upholst-overs

Detachable Upholstery for Your Motor Car

Campbell Upholst-overs are a new type of covering for the cushions and interior trim of motor cars. They are detachable and serve the purpose of auxiliary upholstery.

Campbell Upholst-overs are quite different from ordinary seat covers. One minute shows their difference, one month proves it. In fit, in appearance, in wear there is no comparison. Upholst-overs are the last word in luxury and economy.

Various grades and fabrics, hand cut and tailored to fit all popular makes of cars, at decidedly reasonable prices. Write for samples and prices. Liberal discounts to reliable dealers.

CAMPBELL GUARANTEED MOTOR CAR ACCESSORIES

In addition to Upholst-overs, we make a side line of accessories of the highest quality. These include Percama, the cleaner for tops, upholstery, etc.; straps, boots and leather goods of all kinds; an excellent line of Ford specialties, including the famous Campbell Latigo Ford Fan Belt, made also for Overlands and sold in rolls of 10 ft. and up; One-Man-One-Hand Top for light cars; shock eliminators, etc. Back of every article is the Campbell guarantee of satisfaction.

Write for complete catalog
Interesting proposition to dealers

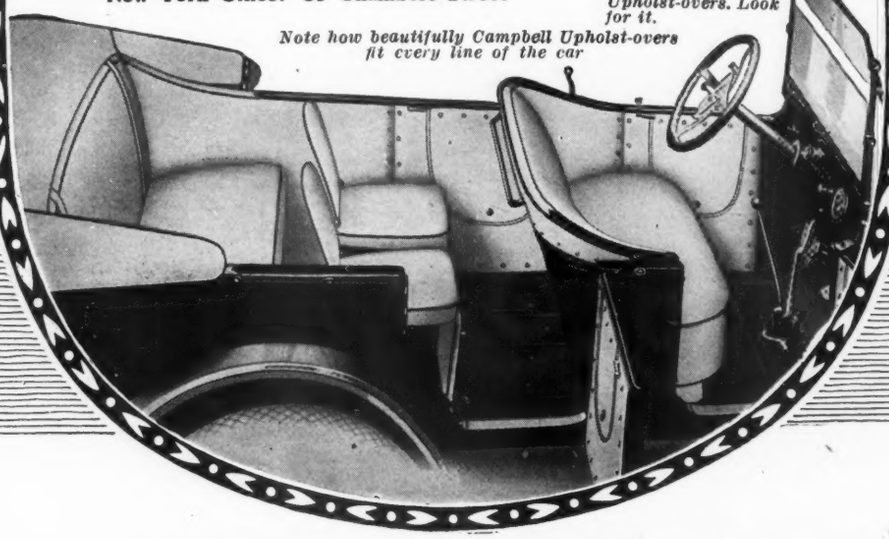
The Perkins Campbell Co., 624 Broadway Cincinnati, O.

New York Office: 89 Chambers Street

CAMPBELL

This button guarantees the fit, wear, and general satisfaction of Campbell Upholst-overs. Look for it.

Note how beautifully Campbell Upholst-overs fit every line of the car



What's the Answer to the Blow-out Question?

But they can't save you from the expense and risk of blow-outs if they are not on your car

A BLOW-OUT is more than a nerve racking noise—more than the ruination of a tire—more than losing control of the car—it is a positive danger! It comes from the inside, from a bruised, weakened, brittle and lifeless fabric—the backbone of the tire.

The Miller Method prevents blow-outs by eliminating their cause—by retaining the natural vegetable wax and oil in the cotton fabric, by not deadening the life of the fabric during manufacture. Oil carbonizes at 240 degrees. The old method of tire building requires 287 degrees to vulcanize a tire. The Miller exclusive process vulcanizes perfectly at a low degree of heat. It makes a rugged unit of both fabric and rubber—without destroying the natural wax and oil of the fabric or burning the native toughness out of the rubber.

The result is a tire that gives you practical immunity from stone-bruises, and the blow-outs that follow.

Perhaps it does not interest you what is put into a tire. It's what you get out that counts. But **you can only** get out of a tire what has been built into it.

In every Miller Tire there is

—additional care used in compounding rubber:
—an extra price paid to procure exactly the right cotton fabric and rubber:
—added time spent to secure the very best workmanship:
—the "Miller Method" of vulcanizing that keeps the life in the rubber and retains the natural wax and oil in the cotton:
—a greater number of inspections to make sure that each part of every tire is perfect:

Together, these items make a big sum total that insures the purchaser of a Miller tire additional mileage, safety and freedom from irksome roadside repairs.

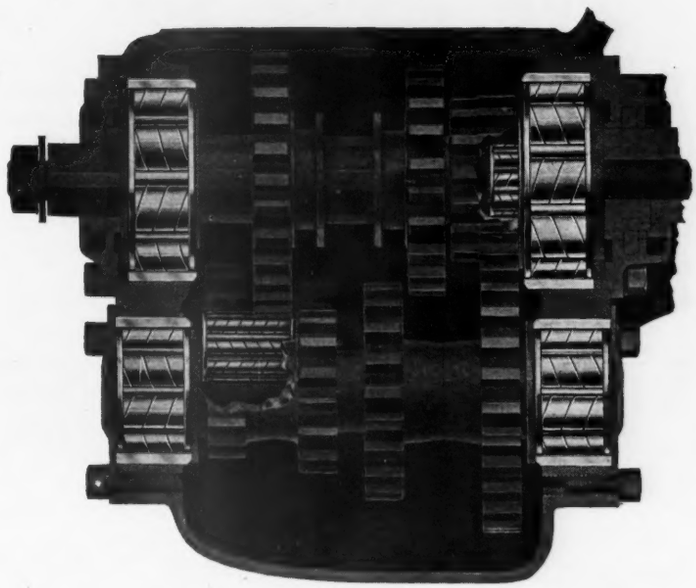
Go to the nearest Miller dealer. When he equips your car with Miller tires—you can put the blow-out question out of your mind.

The Miller Rubber Company, Akron, U. S. A.

Distributors in the Principal Cities

HYATT

ROLLER BEARINGS ASSURE QUIET TRANSMISSIONS



THE QUIET, SMOOTH RUNNING OF AN AUTOMOBILE EVIDENCES AN EXCELLENT MECHANICAL CONDITION; clashing, grinding or jarring noises indicate a lack of co-ordination in the working parts.

The transmission bearings of your car bear the brunt of all the strain and stress in "picking up" on first or second speeds, bumping over a rough road or hitting a chuck hole.

Hyatt Roller Bearings in the transmission of your car assure quiet operation on all speeds.

These bearings not only cushion the road shocks, tend to keep gears and shafts in alignment, and relieve the surrounding parts of extreme load, but also absorb vibrations and thus reduce objectionable noise.

These good qualities are due to the flexible spiral roller—an exclusive Hyatt feature. Further, this spiral roller renders these bearings self-oiling, as the hollow rollers carry a large quantity of the lubricant, and the right and left spirals spread it over the bearing surface.

For **quiet operation** and **"care-free" service,** most of the automobiles made in America are equipped with Hyatt Quiet Bearings in the transmission or rear axle or in both places.

HYATT ROLLER BEARING CO.
DETROIT, CHICAGO
NEWARK, N.J.

ILLUSTRATIVE LITERATURE AND POSTER STAMPS UPON REQUEST

There Are Times When Your Safety Signal Looks as Big as This

That is when it is vital—when conditions in front of your car demand instant action—when car mechanism is inadequate or fails you altogether—*thankfully you sound your*

SPARTON
SAFETY SIGNAL

and clear the way.

Your signal to you in such emergencies is the biggest part of your car. Its quick, decisive command saves the day.

There's no signal so dependable as the Sparton. 90 per cent of all American cars, equipped with motor driven signals, use the Sparton.

The Sparton *calls* its warning on country roads—gives a sharp, quick commanding *cry* on city streets.

Spartons are of many designs and sizes—but all one high quality. The Sparton hand operated signal is an exceptional value—$4.00. The prices range up to $15.00 for the large electric model.

Ask Your Dealer for Demonstration.

The Sparks-Withington Company

Jackson, Mich.

This Ammeter is Remarkable in More Ways Than One

1st—Hard service—even abuse, will not injure it. This we guarantee.

2nd—It is absolutely accurate and is so guaranteed.

3rd—It is guaranteed not to burn out or short circuit.

4th—It is handiest in size. Fits the vest pocket.

5th—It is the lowest in price of all accurate ammeters.

A good ammeter is both an economy and a necessity, for if one dead dry cell is included in a series of live ones, it will quickly destroy the energy of all. It is one of the greatest little time, money and trouble savers a car owner can have.

In **Indestructible Monarch Ammeters** an entirely new, and patented, principle of electric mechanics is used. This unusual principle *of itself* insures absolute unerring accuracy. Yet in order to guard against any possible defect in manufacture or material, each instrument, when completed, is rigorously tested and its reading carefully compared with that of two large and expensive instruments of the most improved type, whose *combined* accuracy cannot be questioned.

INDESTRUCTIBLE MONARCH AMMETER

Unlike all other ammeters **The Indestructible Monarch** cannot be injured by hard service—even abuse. There are no delicate springs or glass dials to break when you drop it. You can safely carry it in your tool kit—slam it around any old way, yet you will not destroy its accuracy in the slightest. *It is practically unbreakable.* You will never need but one.

The Indestructible Monarch Storage Battery Tester is built on the same principle and has the same exclusive features as the Monarch Ammeter. The price is $1.50.

For sale by dealers, garages, service stations, etc.

The Hercules Instrument Co., Inc.

Dept. M. A., Mt. Vernon, New York

Kelly-Springfield Tires Now Sold on New Adjustment Basis

Hereafter when adjustments are necessary they will be made on the following basis: Plain tread, 5,000 miles; Kant Slip tread, 6,000 miles. In Ford sizes, plain tread, 6,000 miles; Kant Slip tread, 7,500 miles.

The word "adjustment," however, rarely figures in Kelly-Springfield speech or correspondence. In 1914 the total adjustments on

Kelly-Springfield

Tires for the whole United States were less than one per cent of sales. You get your tire service in uninterrupted mileage—not in adjustments.

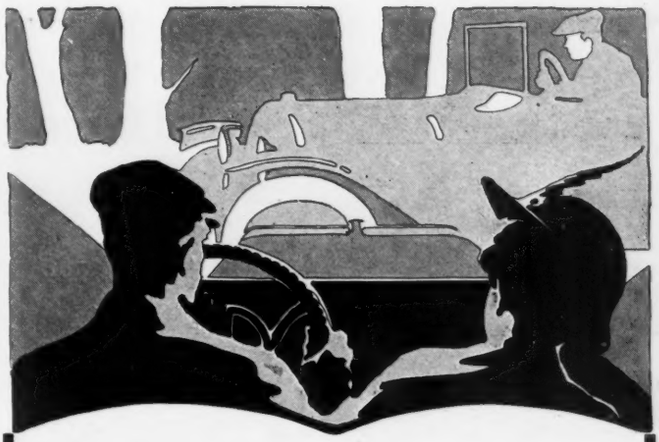
That's because Kelly-Springfield tires are made slowly and carefully by hand from the kind of real rubber that gives real mileage.

Send to 229 W. 57th St., New York City, for "Documents in Evidence," which tells the experience of others.

Kelly-Springfield Tire Co.

AKRON, OHIO

Branches in all principal cities



What stops your Car?

To be able to stop your car—quickly and certainly—that means human life. Absolutely dependable brakes are essential to sure control. Absolutely dependable brake lining is essential to dependable brakes.

Thermoid HYDRAULIC COMPRESSED Brake Lining - 100%

is absolutely dependable. It is brake lining all the way through—not merely a stringy, comparatively loosely woven fabric with only friction surfaces. Thermoid is forced by hydraulic compression into a single solid substance of uniform density, with 100% gripping power. It grips though worn paper thin.

Guard your safety with Thermoid.

Watch your brake lining. Look it over **today**—before trouble can come. You'll find Thermoid at the nearest wide-awake dealers.

Thermoid Rubber Co.
Trenton, N. J.

Our Guarantee—Thermoid will make good or WE will

Makers of Nassau Tires

Cannot be burned out or affected by oil, heat, water, gasoline or dirt.

Make Sure of Your Lights

—and your starting motor. Don't take chances of their failing unexpectedly. A

Weston

Model 354 Ammeter

On Your Dashboard or Cowl

will keep you posted every minute regarding electrical conditions. Its exact information is invaluable—the cheapest and best insurance you could buy. Write for full information.

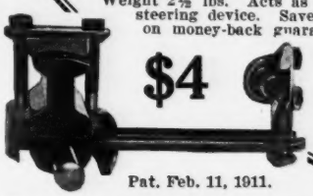
WESTON ELECTRICAL INSTRUMENT CO.
10 Weston Ave., Newark, N. J.
Branches in the Larger Cities

Drive your Ford in a straight line without Steering

Relax when you drive. Don't let the job of steering wear you out.

Badger Ford Automatic Safety Steersman

—automatically holds your Ford to the road without the aid of the steering wheel. Bolts under front axle with stud on tie rod between steering arms. Automatically straightens wheels. Weight 2½ lbs. Acts as shock absorber for delicate parts of steering device. Saves its cost in repair bills averted. Sold on money-back guarantee. **Special Introductory Offer**—We will sell ONE Safety Steersman in each locality for $2.50 prepaid. Send your dealer's name wth order. Regular price $4. Write for free circular.



$4

Pat. Feb. 11, 1911.

Dealers Wanted. Write.
Beware of imitations. Infringers will be prosecuted.

SAFETY APPLIANCE CO.
Baraboo, Wisconsin

Lexington

CRITERION OF ITS CLASS

Thoroughbred Six—$1875
Minute Man Four—$1375
Six Supreme—$2575

Equipped with Moore Multiple Exhaust System

Write for details and co-operative dealer proposition

The Lexington-Howard Co.
18th Street West Connersville, Ind., U. S. A.

The Quality Never Varies In

NON-FLUID OIL

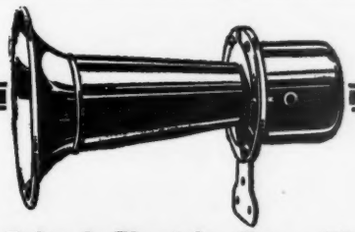
You get the same high grade quality—the same durability—and the same density in NON-FLUID OIL, year in and year out, hot or cold, wet or dry. Unlike LIQUID oils it does not thin down and waste off in Summer, nor decompose and develop acidity and score the bearings like ordinary greases. It lasts 3 to 4 times longer than any other lubricant—hence, is the MOST ECONOMICAL. 90% of all automobile manufacturers recommend it. Why don't YOU try it?

"K No. 00 Special" grade for sliding gear transmission.
"K No. 000" for differential, compression cups and all bearings.

Reduced Prices for 1915. Ask Your Dealer.

Avoid substitutes: Look for the orange-colored can with the above trade-mark

New York & New Jersey Lubricant Co.
165 Broadway, New York 1430 Michigan Ave., Chicago, Ill.



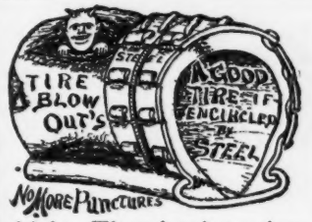
Lowest Priced Electric Horn Obtainable

REXO II

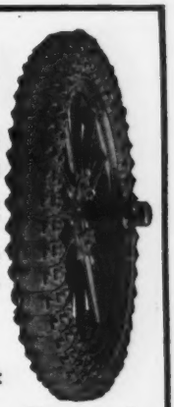
$3.85—Ready to Attach

Guaranteed for the Life of Your Car

THE GARFORD MFG. CO., 2503 Olive Street Elyria, Ohio, U. S. A.



Steel Protectors



Each section 2" wide ⅛" thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

HOW CAN THE RUBBER WEAR OFF IF IT IS COVERED WITH STEEL?

Try 2 or 3 sections over any old blowout

Special prices to the first in new territory

Kimball Tire Case Co. 173 Bdwy, Council Bluffs, Ia.

Tire covered complete

Guaranteed for 10,000 Miles
Brictson Pneumatic Tires

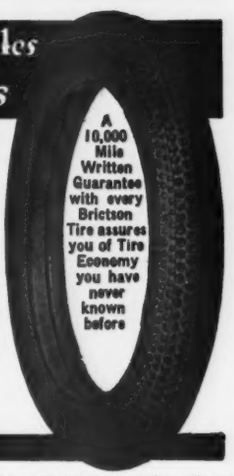
We now sell Brictson Pneumatic Tires on a specific guarantee of 10,000 miles service. *Brictson Pneumatic Tires* are Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim-cut-proof, Oil-proof and Gasoline-proof. A tire with wonderful resiliency and easy riding qualities.

FREE TRIAL OFFER—To remove any possible doubt concerning the merits of Brictson Tires and to back up our statements fully, we have a **FREE TRIAL** offer at our own risk. The only tire made that offers a FREE TRIAL—you can't go wrong. You risk nothing. We take all the risk. Be sure and ask for our FREE TRIAL plan when you write for particulars.

Have Your Present Tires Rebuilt the BRICTSON WAY—if you are not in need of new tires and the fabric in your tires is still good, we can rebuild them the Brictson Way, give you thousands of miles additional service and make them Puncture-proof, Blowout-proof, Skid-proof, Rut-proof. Rim cut-proof, Oil-proof and Gasoline-proof.

Write today for full particulars including details of FREE TRIAL PLAN.

THE BRICTSON MFG. CO.
1255 Brictson Bldg., Brookings, S Dak.



KINGSTON CARBURETOR

Save Money by Economizing Gasoline

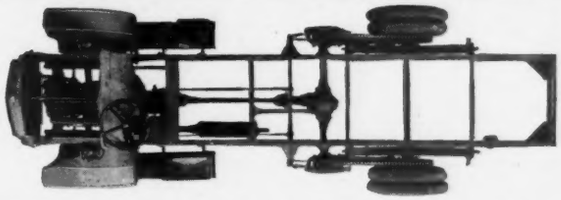
Four floating bronze ball valves opening automatically under different motor suctions supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment

Made by the oldest manufacturers of carburetors in America

ESTABLISHED 1895

BYRNE, KINGSTON & COMPANY, Kokomo, Indiana



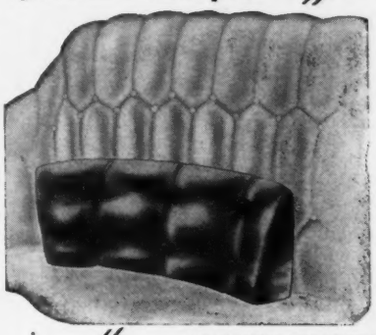
$2750.00 is the price of the New Standard 3½ ton Standardized Truck, which combines more standard parts than any other truck:

Such as Continental, Brown-Lipe, Timken, David Brown, Spicer, Gemmer, Stromberg and Eisemann all superior names that appear in **Standardized** construction, which are the surest proofs of absolute quality.

It will pay live agents to investigate.

Standard Motor Truck Company DETROIT MICHIGAN

$1.50 to $3.50



EASYBAK

Protects Your Comfort

Provides driver and passengers with a comfortable, sloping support for entire back. Just as comfortable as a Morris chair. Prevents backache and touring fatigue.

Try One 10 Days

Automobile seats have to be built to accommodate abnormally large people, which causes discomfort to passengers of average or slender build. EASYBAK makes the seat fit you—conform perfectly to the contour of your figure. Write for free circular.

Dealers—Big sales at good profits. Write for discounts.

HOLDEN MANUFACTURING CO.
St. Paul, Minnesota

TO FORD OWNERS

The "Parker-Hydraulic" Pressed Steel Wheels are in the market.

They are lighter than demountable wooden wheels.

They are stronger than demountable wooden wheels.

The Rims are more easily demounted than from wooden wheels.

The enamel is baked on and will last longer than the paint on wooden wheels.

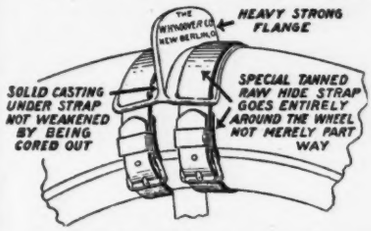
They cost, enameled black, $19.75 per set of four spiders, five clincher rims and twenty-four bolts.

Extra for enameling red—75c per set.

Responsible dealers wanted throughout the country

THE HYDRAULIC PRESSED STEEL CO.
3170 E. 61st St., CLEVELAND, OHIO

WITH THIS MUD HOOK



you can dig out of the deepest mud or sand and the Hook will stand the strain.

THE HOOVER MUD HOOK

is a practical and sturdy device, made right for the work.

Heavy cast flange—plenty of metal to give necessary strength. Special tanned rawhide straps, going entirely around the wheel. Shipping weight, packed for parcel post, 3 lbs.

Many times more effective than chains to get you out of a hole. Prices: No. 1, for 3 to 4½ in. tires, $1.00; No. 2, for 5 to 6 in. tires, $1.10.

Write for 1915 Catalogue of Auto Leather Necessities

The W. H. Hoover Co., New Berlin, Ohio

$20-$25

Normal

Ford $12.50

Controls The Rebound For Comfort

You can't get out and smooth the country roads for easy riding—but you can control back-wrenching spring recoil on your car, for comfort, with

The Parker Shock Absorber

—that soothes the springs by maintaining neutralizing tension between your car and the axle. It is the *only shock absorber that works all the time.* Absolutely guaranteed. Write for details.

We Want Dealers Everywhere

RUPE & KEMP
1215 S. Franklin St. Muncie, Ind.

The United States Motor Truck Co.

CINCINNATI, OHIO

OFFERS A FINE OPPORTUNITY TO DEALERS

U. S. Trucks *Get Our Proposition*

ECONOMICAL and POWERFUL

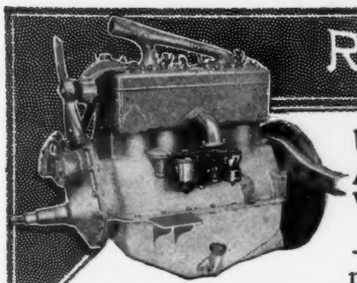
FLEXIBLE and DURABLE

Every Owner a Booster

MADE IN 2, 2½, 3 AND 4 TON CAPACITY

The correctness of its construction combined with best quality materials and right prices, make the U. S. a splendid value for buyers and a good proposition for dealers.

Specifications and prices on request. Address Contract Dept. B.



THE RUTENBER MOTOR

Used in America's Best Light Weight Cars

—costs less to buy and maintain — and gives service equal to motors twice as expensive.

Model 20
3½x5
4-cylinder

The Rutenber Motor Co.
MARION INDIANA
Chicago Office.....10 S. La Salle St.

McNUTT

NON-EXPLOSIVE SAFETY CANS AND DEVICES

Volatile Oil Containers of Every Description for Every Use

JOHN C. EAMES, Inc.,
320 Broadway, New York, N. Y.

The Clearing House
of the Motor Car Industry

For Second Hand Cars, Surplus Parts, Accessories, Tires, Machinery & all other Special Announcements of a Similar Character

ADVERTISING RATES Minimum space, ½ inch—One time, $2.40. Three times, $5.85. 1 inch—One time, $4.50. Three times, $10.80. 1½ inches—One time, $6.75. 2 inches—One time, $8.75. Rates for other spaces and longer terms on request.

CARS FOR SALE

FOR SALE

Two cylinder, shaft drive, Jackson Roadster, absolutely good as new, worth more than good horse and buggy, make fine delivery wagon. Demonstrate to anyone. For further particulars write us. **Albany Auto Co., Albany, Wis.**

FOR SALE

One 1914, four-cylinder Cadillac completely equipped, in perfect condition. Will guarantee ninety days, $1350.

TRENTON MOTOR CAR CO.
2646 Locust St. St. Louis, Mo.

FOR SALE

New 100 H. P. Racing Car, tested to 112 miles per hour. Driven less than one thousand miles. All parts standard and duplicates in stock.

E. R. THOMAS MOTOR CAR CO.
Buffalo, New York

FOR SALE

Six 20-passenger White gasoline busses at a bargain. Apply to

Box 126, Huntington, Ind.

GET OUR LATEST BULLETIN OF USED CARS

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The Clearing House—continued.

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This tool will positively completely change a Ford clincher tire in one minute without labor. Postpaid for $1.00. Dealers, send for circular and dozen price.
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Will Be Continued

The recent auction sale at the Krit plant was for the purpose of disposing of all obsolete material and surplus production stock. No items of any kind were sold that will be needed by us in maintaining the Service Department for Krit dealers and owners.

The Service Department will be continued on a better and more satisfactory basis than ever before. The auction sale in no way affects the continuation of the business of the Service Department.

The Krit Motor Car Company is here to stay and you may absolutely depend upon getting prompt and accurate shipment of all parts just as long as there is a Krit car running.

Address all mail the same as always—to the Krit Motor Car Company, Detroit, Michigan.

Krit Motor Car Company
Detroit, Michigan

Late Spring Bargains

Send cash with order for there is only a limited supply.

Round tire trunks, each	$ 3.00
Racing seats, black or gray, pair	20.00
Ford racing gears, 3 to 1 ratio	12.00
New Marine motor, 2½x3½, with pump	80.00
One-piece, roadster nickel windshield	10.00
Briggs & Stratton 4 cyl. ignitor	16.00
New Dyneto electric generator	24.00
Disco, 12 volt, electric starter	21.00
New Remy 4-cyl. Unisparker with magneto base	15.00
Electric starter switches	1.50
Ward-Leonard, 6-volt generator	27.00
Bulls eye dash oilers	.75
Pittsfield, 4-cyl. dash coil with switch	12.00
New 2-cyl. Atwater-Kent coils	5.00
New 4-cyl. Remy coil and kick switch	8.00
Six-feed mechanical Hill oilers	3.00
Special combination pliers, nickel, 6"	.25
Model K. O. 1" Stromberg carburetor	13.50
Overland rubber floor mats	.30
Model 11 Stewart speedometers	11.50
Black enamel carbide generator	1.00
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Round leather belting, 5/16", per foot	.05
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MICHIGAN MOTOR CAR PARTS CO.
Successors to
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MORE SPEED FOR THE FORD

Special Ratio Differential Ring Gear and Drive Pinion for the Ford. Either 2 4/7 to 1 or 3 to 1 ratio.

More speed with maximum power at a decreased cost in gasoline and oil consumption is the result obtained by using either of these ratios, because they prevent the "racing of the motor" which is necessary with the regular Ford ratio (3.63-1) to make time.

EITHER RATIO $15.00 PER SET

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Complete line of Electrical Accessories. Guaranteed Repair work ON ALL MAKES OF

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And everything electrical for your car

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We maintain separate departments for each different line of repair work. Each department is equipped with special testing devices and the most modern machinery. Each department employs only expert electricians, who are best adapted to that department's special work.

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Paint Your Car Yourself

Save $25 to $75 by doing the work at home with the Arsenal system. Our big free booklet, "The Car Beautiful," tells how. Send for it today.

Arsenal Varnish Company
Auto Dept. Rock Island, Ill.

Prest-O-Lite Gas Tanks B, $10.50, Black and Nickel Windshields, $6; Ford Gas and Electric Head Lamps, $3.25 pair; Spark Plugs, $0.25. One-third with orders.

BENEDICT, 63 Winder St., Detroit, Mich.

The Clearing House—continued.

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Wonderful Bargains

Batteries

6-Volt, 100-hour (without box).....$ 8.98
16-Volt, 50-hour (without box)..... 10.00
Boxes ..... 1.20 up

Puritan Permanent Portable Garages

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All makes and sizes—Carburetors—Bargains

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Big stock radiators for all other cars.

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Extra light reciprocating parts and accurate cylinder grinding my specialty.

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Furnish our heat treated piston rings and pistons. First class equipment, 15 years' experience. Write for our prices.
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Factory blemished tires, 40% to 60% off!! Premier Red Tires guaranteed 4,000 miles, 25 to 35% off!! Send for price list.
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30x3½	6.00	7.80	34x4½	10.00	17.60
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33x4	9.00	11.85	37x5	12.00	21.00

10% deposit with order. Balance C. O. D. subject to examination.
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Mohawk Non-Skid Treads Vulcanized on Tire

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Workmanship and Material Guaranteed 2500 Miles
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immediately. They are made of 4 and 5-ply high grade fabric and completely encircle the inner tube. Our prices for these now are less than you can purchase the cheapest reliners. We have only 70 left, but have nearly all sizes.

	Our April 1 Price	Now
3-inch	$3.06	$1.53
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4-inch	4.95	2.48
4½-inch	6.32	3.16
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An Unconditionally Guaranteed

Tire—guaranteed to give 3500 miles of actual service, or a new tire for ¼ of purchase price.
Our proposition will interest you
CONSUMERS TIRE CO.
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"Tico Red"
Double Tread Tires

Oil-proof Puncture-proof Weather-proof

$2.00 to $4.00

Guaranteed 2,500 Miles
WE HAVE KNOWN THEM TO GO 16,000 MILES

By our remarkable process we rejuvenate your old junk tires, making your two old tires into one "Tico Red" Double Tread Tire.

Our new red chemical application makes the "Tico Red" Double Tread Tires absolutely oil proof and weather proof thereby insuring them against the harmful effects of oiled roads and oily garage floors and against water and sandy roads.

"TICO RED" DOUBLE TREAD TIRES have double thickness and are almost impossible to puncture.

"TICO RED" DOUBLE TREAD TIRES are double reinforced and cannot blow out.

"TICO RED" DOUBLE TREAD TIRES are chemically made oil proof.

"TICO RED" DOUBLE TREAD TIRES are chemically protected from weather, sand and water.

"TICO RED" DOUBLE TREAD TIRES will outwear any ordinary tire.

"TICO RED" DOUBLE TREAD TIRES made from your old tires mean a remarkable saving.

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Our Wonderful Offer Don't Send Any Deposit

Just send two old junk tires. We will make them into a "TICO RED" DOUBLE TREAD TIRE, Positively guaranteed for 2,500 miles, and will send it to you C. O. D., with privilege of examination.

List for making your own two old tires into a "TICO RED" DOUBLE TREAD TIRE:

Size.	Price.	Size.	Price.
28x3	$2.00	35x4	$3.40
30x3	2.25	36x4	3.50
30x3½	2.50	34x4½	3.60
31x3½	2.60	35x4½	3.70
32x3½	2.70	36x4½	3.80
34x3½	2.80	37x4½	3.90
31x4	3.00	35x5	4.00
32x4	3.10	36x5	4.00
33x4	3.20	37x5	4.00
34x4	3.30	37x5½	4.00

If you have only one tire we will furnish the other, the additional cost to you being just double the amount listed above.

When inner shoes or patches are required they are put in at a nominal charge of 25 to 50 cents each. Express charges must be prepaid on all tires sent us. We reserve the right to reject any tires not suitable.

"Tico" Double Tread Tires Guaranteed 4,000 Miles

These tires are made from the most carefully selected material and are running from $5,000 to 10,000 miles.

Specify whether you want red or plain tires. Carried in stock at the following prices:

Size.	Price.	Size.	Price.
28x3	$4.95	35x4	$ 9.90
30x3	5.60	36x4	10.00
30x3½	6.85	34x4½	11.50
31x3½	6.95	35x4½	12.00
32x3½	7.15	36x4½	12.50
34x3½	7.55	37x4½	13.00
31x4	8.15	35x5	13.50
32x4	8.75	36x5	13.75
33x4	9.25	37x5	14.00
34x4	9.75	37x5½	14.50

For non-skids add 10 per cent to above. We will ship any tire C. O. D. subject to your examination and approval. Send $1.00 deposit for each tire.

Specify the style of your rim.

Tire Co. of America

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WORLD'S LARGEST TIRE DEALERS
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The Clearing House—continued.

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I have just bought the plant of the
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Factory Address, HARRISON, N. J.

TIRES TIRES
All Fresh Selected Seconds

	Case	Tube		Case	Tube
30x3	$ 6.00	$ 1.85	34x4	$12.90	$ 3.00
30x3½	7.90	2.05	35x4½	17.90	3.60
32x3½	8.65	2.25	36x4½	18.25	3.70
33x4	12.60	2.95	37x5	21.00	4.50

All other sizes in stock. Non-skid 10% extra.
All orders C. O. D. on approval.
TIRE SUPPLY COMPANY
1101 Hennepin Ave., Minneapolis, Minn.
Full guarantee on all inner tubes.

NEW PRICES ON PREMIER RED TIRES

Size	Plain	Non-Skid	Tube
30 x 3	$5.85	$6.45	$1.95
30 x 3½	7.50	8.25	2.25
32 x 3½	7.85	8.65	2.35
33 x 4	11.40	12.55	3.25
34 x 4	11.95	13.15	3.35

Other sizes at proportionate prices.
Mail Orders Given Prompt Attention.

Dealers----Write for our special proposition

Note—The popular demand is for a high-grade unguaranteed first tire. We are meeting this demand with Premier "The safe investment tire." You benefit by the low initial cost.

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TIRE BILLS CUT IN HALF

We guarantee you 2000 additional miles out of your old casings. Send us two old tires, and we return them as one ready for hard service. We are saving thousands of motorists money by our reclaim system.

Write us today

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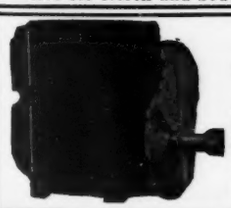

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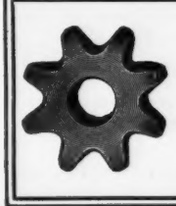

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